Bennett Pacific Series

1000 Series Remote Dispensers

Electronic Service Manual

Only Trained Personnel May Work on This Equipment

READ THIS BOOK This book has important information for safely servicing of this equipment. Read and understand this book before attempting troubleshooting. Keep this book and tell all service personnel to read this book. If you do not follow the instructions, you can cause bodily injury, death or damage to the equipment.

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Bennett 1218 E. Pontaluna Road, Spring Lake, MI 49456
USA 800-235-7618 ~ Outside USA 231-798-1310
sales@bennettpump.com ~ www.bennettpump.com

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Introduction

This manual covers service information for the electronic components of Bennett pumps. It covers the Pacific Series with 708 electronics. Information is correct at time of publication. For more information, please contact the Bennett Customer Response Department at Bennett Pump in Spring Lake, Michigan.

UNAUTHORIZED ALTERATION OF BENNETT PRODUCTS

Bennett Pump Company products are designed to meet or exceed the standards of UL, FCC and the National Institute of Standards and Technology. These standards protect the operator and the consumer from personal injury and insure an accurate delivery of product. Any deviation from the use of authorized replacement parts or alteration of a designed product configuration may cause personal injury, death or the revocation of one or all of the above approvals.

The most frequently abused design alteration of Bennett products is the conversion of a self-contained model (pumping unit in the dispenser cabinet) to a remote dispenser (submerged pump in the storage tank). This field practice has mainly occurred in an effort to overcome the problem of vapor lock. Bennett Pump Company does not condone nor offer a kit or instructions for this type of conversion. Bennett Pump Company strongly opposes this type of conversion. Safety standards required by the agencies above are violated when unauthorized conversions are performed. Bennett Pump Company recommends the replacement of a self-contained model with a remote dispenser model to overcome the problem of vapor lock. The Pacific Series does not offer a self-contained model.

Bennett Pump Company will not assume responsibility or liability for any consequential injury or damage caused by the unauthorized alteration of its products.

NOTE: Before performing any type of service to the dispensers, be sure to shut off all electrical supplies and secure them in the OFF position. Close all valves in incoming piping. Also, to prevent the risk of electrical shock from sub pump feedback, make sure you disconnect the field wiring from the power distribution board by using the quick disconnect terminals provided at the bottom of the power distribution board. Maintenance must be performed by trained personnel ONLY.

BEFORE SERVICING A BENNETT DISPENSER, CHECK THE FOLLOWING:

1. Make sure all dispensers are correctly grounded with 12 gauge wire.
2. Make sure input voltages are within operating level: 120VAC (96 to 135VAC) or 240VAC (192 to 276VAC).
3. There are no more than two units operating on a clean and dedicated 120/240VAC voltage sources.
4. There are RC networks installed across the coil of the motor relay and contacts of remote submerged pumps.

**IF ANY DEVIATION FROM THE ABOVE IS FOUND,
CORRECT THE PROBLEM BEFORE PROCEEDING.**

Safety Instructions

WARNING ADVERTISSEMENT ADVERTENCIA

For the safe installation of this equipment, read and understand all warning and cautions. Look for these warnings:

"DANGER" means: If you do not follow the instructions, severe injury or death **will** occur.

"WARNING" means: If you do not follow the instructions, severe injury or death **can** occur.

"CAUTION" means: If you do not follow the instructions, damage **can** occur to the equipment.

DANGER: Fire, explosion, injury or death will occur if fuel filters are changed by untrained personnel. Make sure only trained personnel change filters.

DANGER: To prevent injury to you from vehicles and onlookers, always place a barrier around this equipment before performing service or maintenance.

DANGER: Gasoline is flammable. NO SMOKING OR OPEN FLAME.

DANGER: Disconnect all power to this equipment and associated submerged pump(s) during installation, service or any maintenance, i.e., changing filters.

WARNING: You must have training in the installation, service or maintenance of this equipment (dispenser, pump, console, control box or submerged pump) before working on it. Maintenance repairs must be done by authorized personnel only. Warranty work may only be performed by Bennett certified technicians.

WARNING: To prevent electric shock, keep the electrical parts of the dispenser dry.

WARNING: Electronic components are static sensitive. Use proper static precautions (static straps) before working on the equipment.

WARNING: The emergency shut-off valve (also called the fire valve, shear valve or impact valve) must be closed when service or maintenance is performed on this equipment.

WARNING: You must have training in the operation and programming of this dispenser before using it. READ THE OPERATORS MANUAL.

WARNING: Make sure this equipment is correctly grounded. Failure to do will cause injury or damage equipment or improper operation. Improper grounding voids the warranty.

WARNING: When anchoring the dispenser, always level the dispenser with shims before bolting to the island. DO NOT shim just the middle of the dispenser and bolt down.

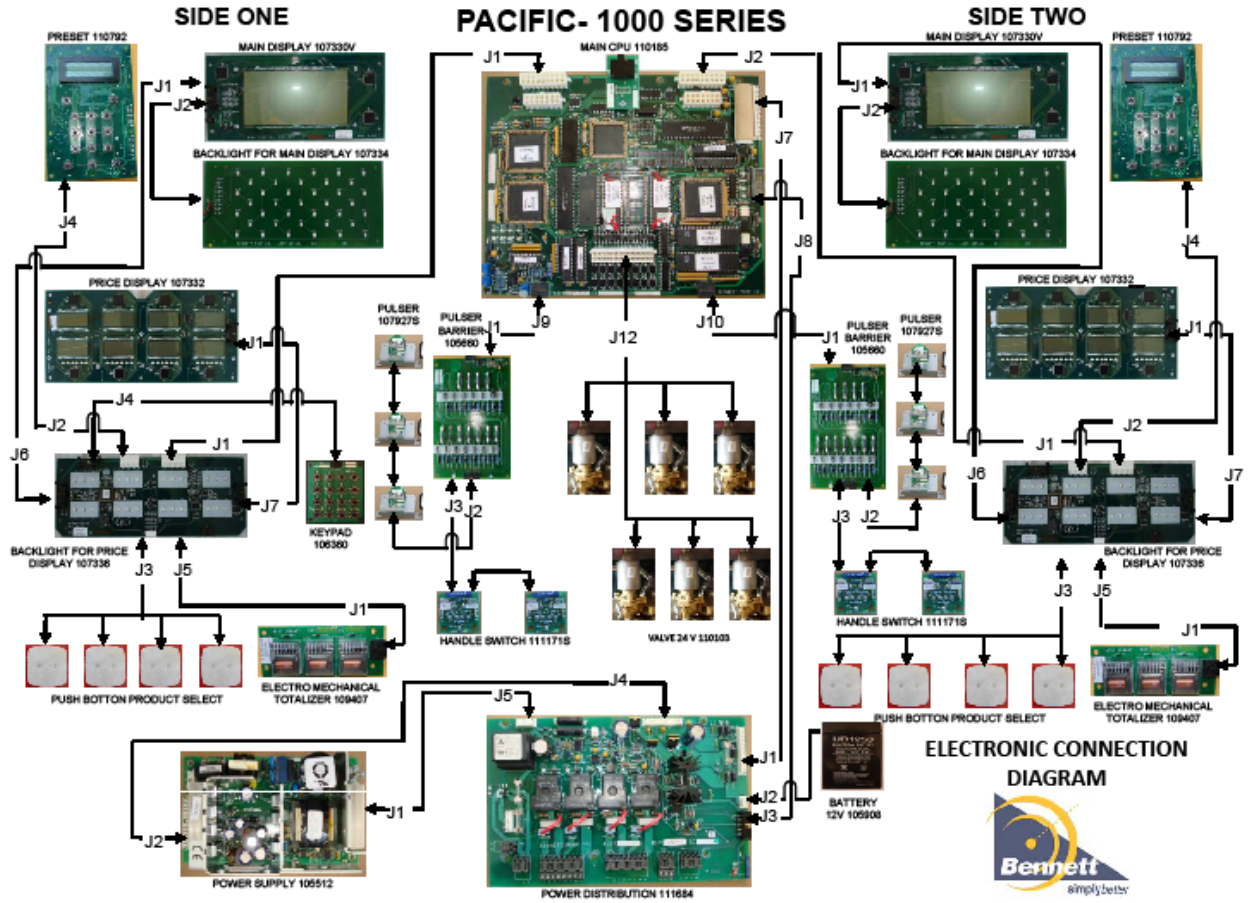
CAUTION: Do not drill holes in fuel dispensers. Holes can cause failure of the electronic equipment. The warranty will become void. Use only adhesive backed sign mounting brackets.

READ AND UNDERSTAND ALL WARNING LABELS ATTACHED TO THE DISPENSER

NOTICE

This device complies with part 15 of the FCC rules. Operation is subject to the following 2 conditions: (1) This device may not cause harmful interference and (2) this device must accept interference received, including interference that may cause undesired operation.

Overview of 708 Electronic Components



Basic System Theory of Operation

110– 230 Volts A.C. 50 or 60 cycle power comes into the dispenser through field wiring to the bottom of the Power Distribution Board terminal strip (TS1). Power then passes through a 3 amp fuse and then is filtered for noise. Any electrical noise is dampened out by this filter FIL1. The power is then passed from the Power Distribution Board to the Power Supply (through connector J5) for Direct Current (D.C.) conversion. There is only one Power Distribution Board and one Power Supply for the dispenser.

Power comes into the Power Supply assembly on connector J1. This power supply creates various D.C. Voltages for use throughout the system. Specifically, the power supply takes the 110– 230volt A.C. input to create the following voltages:

1) +24 Volts DC
2) +12 Volts DC
3) +5 Volts DC

These voltages have tolerances of +/- 5%. There are no adjustments for any of these voltages but there are test points.
The DC voltages are fed back to the Power Distribution board connector J4 through a multi-pin conductor connected to J2 of the Power Supply. There is fuse protection on the Power Distribution Board for both power coming into the system and also fuse protection for power traveling internal to the system. From there the DC voltages are sent over to the CPU board through another multi-pin conductor from connector J1 of the Power Distribution Board to connector J7 on the CPU board. From this point the voltages are distributed to all other parts of the system.

Overview of 708 Electronic Components

Battery Backup— A separate rechargeable +12volt battery is connected to the Power Distribution Board. When the dispenser is in normal operation the battery is not used and is charged by the +14 volt D.C. battery charging circuit located on the Power Distribution Board. When main incoming power is removed from the system or when the system incoming AC voltage drops below 74 volts AC, the CPU detects this and the dispenser goes into “Power Fail” condition. At this point the battery supplies +12 volts DC for 30 seconds to the system or unless you use the magnet provided to close the battery kill reed-switch. This battery kill switch allows the technician to eliminate the 30 second wait if he has to service the equipment. The battery itself is connected at the factory but requires several hours to charge. This battery has nothing to do with maintaining system programming in the event of a power outage.

The Power distribution board has other functions as well. This board houses four solid state relays that are used to route incoming power as Motor “Out” signals to turn on remote submerged pump relays. These relays are controlled by +12 volt DC signals from the CPU board. When the CPU board wants to turn on a submerged pump, it sends a +12 volt dc signal to the proper relay pulling in the coil and routing the power to the proper terminal on the terminal strips located at the bottom of the Power Distribution Board. When the CPU wants to turn “Off” a motor, it removes the +12volt dc signal which opens that relay. In the case of blended products, more than one relay is activated at one time.

Dispenser communication with a Point of Sale and Card Reader communication is also routed through the power distribution board. Dispenser communication comes in from the model 515 box to the power distribution board terminal strip TS5. This is the current loop communication signal that passes through the Power Distribution Board on connector J3 through a ribbon cable to the CPU board connector J8.

Card reader communication also is routed through the power distribution board. Card reader information comes from the IC Box through twisted pair wiring (3 wires) and connects to terminal strip TS4. This is RS485 protocol. This information follows the same path through the power distribution board as the dispenser communication, that is, it exits the power distribution board through the same ribbon cable over to the CPU on connector J8.

The CPU board— The CPU board is the heart of the system. It runs the software, has the memory, communicates with Point of Sale, sends control signals to the solid state relays, sends display signals to the display boards, communicates with the product select touch panel, interfaces with the handles and pulsers through the Intrinsically Safe Barrier Boards, controls the proportional valves through a wiring harness. It performs the blending functions, and stores historical data for sales and diagnostics. It receives power from the Power Distribution Board. It also routes power to the card reader system. It also communicates with and sends signals from the Vapor Recovery system.

There is one CPU board per dispenser and it can be accessed easily by opening the electronics enclosure door. The CPU board is mounted vertically and has various cables and harnesses connected to it.
The CPU receives dc voltages from the power distribution board on connector J7. The wiring harness is color coded and uses the following color scheme:

1) Orange - +24 volts dc — Valve, printer, display and backlighting
2) Yellow- +14 volts dc — Battery charging circuit
3) Red - +12 volts dc — Product select, Card reader, Pulsers, Handles, Display and Solid State Relays
4) Black - DC Ground — Reference for all DC voltages
5) Violet - +5 volts dc — System logic voltage used by the CPU

The CPU board is physically mounted to the Intrinsically safe barrier modules.

Overview of 708 Electronic Components

Intrinsically Safe Barrier Modules - The Intrinsically safe barrier modules provide protection to the handle and pulser circuits located in the lower half of the dispenser in the hydraulic area. These circuits are designed with fuses and zener diodes to prevent any potential energy from entering the hydraulic area so that under no condition will there be enough energy to create an electrical “spark”. This way, there can be no explosion if there are vapors. There is one ISB for side 1 and one for side 2. The boards are identical. The fuses on these boards cannot be replaced in the field as a UL requirement. These boards are covered with a metal cover to protect the circuits from an inadvertent short and the covers should always be in place when the dispenser is in operation. The ISB’s do not have any discreet or “smart” components. There are two ISB modules for a two sided dispenser, they are identical and interchangeable.

Dual Phase Pulsers - Pacific pulsers are dual phase electronics pulsers that pulse at a rate of 1024 pulses per gallon. These pulsers are physically mounted to the output shaft of the meter. As fuel flows through the meter, the output shaft rotates and turns the pulser. Approximately 8 rotations of the meter represents 1 gallon of fuel. The pulser is an optically coupled device and outputs 2 separate phases of square wave pulses through a ribbon cable connection, in a daisy chain fashion where it connects through the “flame deck” to the ISB for that side. The pulsers operate off a regulated +5volt dc signal that was created from a +12volt supply. When the valves are closed and there is no fuel flow, there should be no pulses output from the pulser. The pulser only generates pulses as it is turning. As it turns and generates pulses, it sends these pulses to the CPU board through the ISB for that side. The CPU counts the pulses and performs the mathematical computations to covert this information to a display readout that shows the volume and it’s computed currency value on the main display. The CPU and the pulser works in conjunction with one and another. For example, when the CPU receives it’s first 9 pulses, it opens up the proportional valves. At this point it is making sure that both phases are working. If one of the phases of the pulser is not working, the dispenser will never come out of slow flow. Generally, a retail dispenser in fast flow puts out a maximum of 10-12 gallons per minute maximum due to state and federal regulations. There is one pulser for every meter.

Error checking - The dual phase pulsers allow for error checking. One phase is used to check the other. For example, after pumping 1 gallon of fuel the CPU should see approximately 1024 pulses from each phase. There is a built in diagnostic where if the CPU sees more than 26 consecutive missing pulses from one or the other of the phases it will stop the sale and post an error message on the display of the side of the dispenser with the error. Also, on the blended product, if one or the other product going into the mix is dispensing too slowly, an error will result. Errors are stored in a diagnostic history file and any error that occurs can be cleared by removing and replacing the nozzle from the nozzle boot, or lifting and lowering the lever if it is set up in the Lever Option (see page G-8).

Nozzle Boot - Handle switches allow the system to know what product the customer wants to dispense and signals the CPU to turn on the proper pump motor. The handle switch uses a magnetic proximity switch to signal when the nozzle has been removed from the boot and the lever lifted. On the nozzle boot there is a spring loaded lever. Attached to the lever is a magnetic. When the nozzle is removed from the nozzle boot and the lever rises (auto on) or the lever is lifted (lift to start) it moves the magnet away from the proximity switch on the handle circuit board. When this happens, the switch is opened and sends a signal to the CPU. The CPU reads this signal and determines if it is handle A or B and then turns on the appropriate relay to turn on the remote motor. When the handle is returned to the nozzle boot this signals that the sale is complete and the CPU sends this information to the Point of Sale device (if there is one). There is a handle switch for every nozzle boot.

Proportional Valve control - The CPU also controls the valves. The valves are there to control product flowing through a hose. They prevent the unauthorized dispensing from a hose that isn’t authorized. They are also used to slow down the flow towards the end of a pre-pay or preset sale. These proportional valve operates off +24 volts dc. The CPU pulses or “modulates” the valve with pulses based on the rate of what is programmed in for the blend ratio through the dispenser programming. For example, if the dispenser is set for a 60/40 blend, it will modulate the first product for a 60% mixture and the second product to produce 40%. It checks the output pulses of the respective meters to see if it is

blending properly or if it has to “modulate” one or the other valve more or less. If the mixture does not meet the blend ratio setting within a programmable tolerance, then an error will result and the sale will stop. The maximum blend ratio that can be set is 95/5 or 5/95. The error tolerance can be set from 1 % to 99 %. We recommend setting this for 10%.

Outlet Manifold - The outlet manifold for the right hose contains a check valve for each product being delivered. The same check valves are used here and in the inlet manifold. The left hose is only used for the non-blended fuel which does not require a check valve.

System Memory - A +3.3 volt dc on board battery is provided on the CPU board for maintaining system programming in the Random Access Memory (RAM) during a power outage or anytime the system is turned off. This battery is not replaceable. This battery is designed to outlast the longest of power outages.

System software - The dispenser “operating program” is provided by use of two 32 pin EPROMS. These EPROMS determine the functions that are available on the dispenser.

Product Select - The product select board is where the customer can either press a “start” button or select an octane or “grade” at the beginning of the fuel transaction. The product select is similar to a standard keypad but is not a standard dry contact type keypad. Instead, the keys on this board are activated using the principle of capacitance. The customer removes the nozzle and makes either a grade selection or presses a “start” key on the product select. The customer should hear a “beep” when pressing any key.

The product select is activated by human touch. There are diagnostics built in to test these keys on the product select board. The product select is connected to the CPU by means of a wiring harness. This wiring harness is also used for the CPU to send power and talk to other components such as the display board and backlight board farther down the line.

The product select board includes the Price Per Volume Displays.

Main Display - The main display is used for the customer to view the currency and volume amount of the sale. The display gets its information from the CPU through the product select board.

Electromechanical Totalizer Board - The dispenser is equipped with an Electro-mechanical totalizer for each hose which records the volume dispensed for each sale. The volume recorded is an accumulative total that cannot be reset. The total is cumulative and reads in whole unit (gallon or liter) increments.

Main Display Backlighting Board - The dispenser does not use lights or ballasts. To light the display it uses a backlight board using a series of 1.5 volt Light Emitting Diodes (LED’s). By using this type of lighting it eliminates the need to replace burnt out light bulbs and ballasts. These LED’s are powered from 24 volts it receives from the main display.

Local Preset Option - Another option that is available is the Local Preset. This option is generally for attended fueling sites where the attendant can select the money or volume of the transaction. The dispenser stops at the preset amount. A receipt printer is available.

The local preset electronics is mounted the same place that the card reader would be mounted in the dispenser electronics. Therefore, the local preset and the card reader system cannot co-exist in the same dispenser.

The local preset is programmed using a standard PC ASCII keyboard with an OS2 connection. There are 2 languages to choose from. You can also program receipt header/footer information.

Overview of 708 Electronic Components

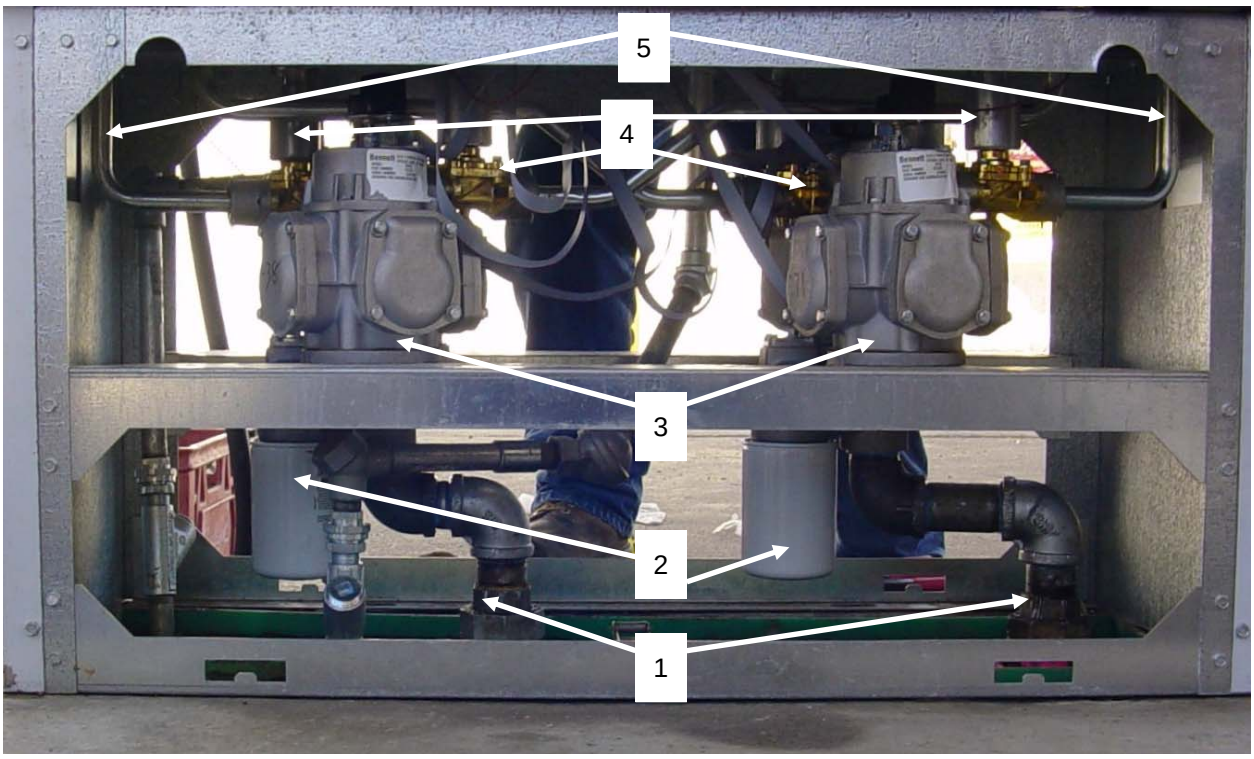
Normal fueling transaction at the dispenser - When a customer wants fuel they lift the nozzle from the nozzle boot. That signals the CPU that the customer wants fuel. They are then prompted by the display to select a grade or octane. Once the product is selected, and if the dispenser is in "stand alone" the dispenser shows all 8888's in the display (segment check) sends out the appropriate motor control signal. If the dispenser is in "Console" control, it waits until authorization has been received from the console. Then, the appropriate valve is opened after the programmed delay time expires for the leak detectors. Fuel begins to flow.

Liquid flow through the dispenser - The dispenser sends a 120vac signal to the relay used to control the submerged pump. As the signal energizes the coil it closes the contacts sending the proper voltage to the motor. As the motor turns on it pressurizes the product line to approximately 28 P.S.I.

Once the product begins to flow it goes through the normally opened shear valve and enters the product inlet of the dispenser (see figure A.1). From here, the product gets purified through the filter (see figure A.2) and then passes the check valve (not present). The check valve is located in the same manifold as the filter, on the opposite side.

Once it goes through the check valve it enters the meter (see figure A.3). When the product leaves the meter the flow is controlled by the proportional valve (see figure A.4). If the blended grade is selected then the CPU Board will modulate a 24vdc signal to both valves to create the blend ratio programmed in the dispenser. From this point the product goes through a 3/4" steel tube (see figure A.5). The product travels through this tube at approximately 10 - 12 G.P.M. up the side of the dispenser into the outlet manifold. From here the product is dispensed through the hose and nozzle of the dispenser.

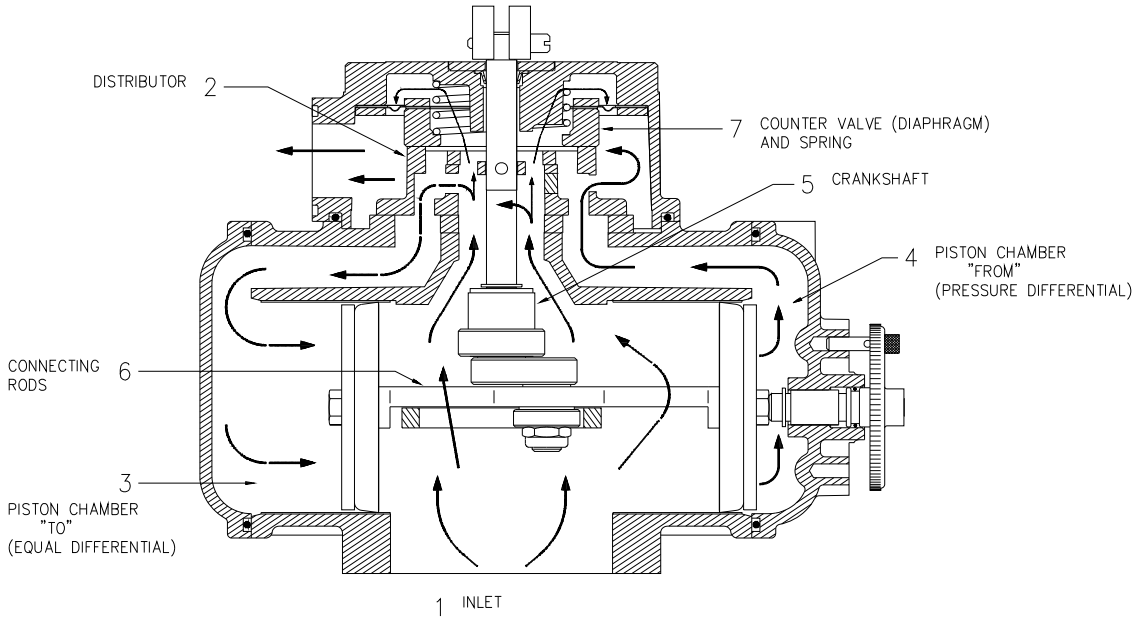
Figure A



Overview of 708 Electronic Components

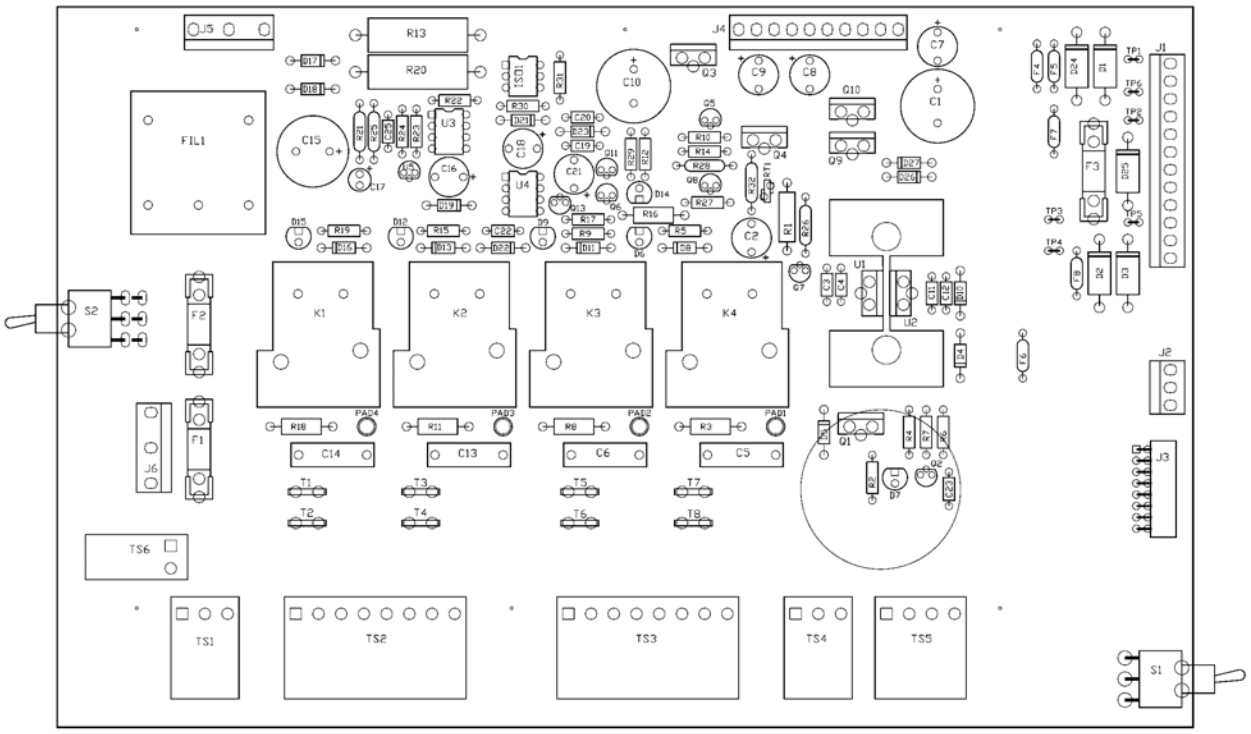
Product enters at the bottom inlet (see figure B.1) and fills the inner cavity of the meter. As the meter body fills, product passes around the crankshaft and up to the top throat of the meter body. From the top throat, product flows to the distributor (B.2) which either ports product “to” or “from” each of the four piston chambers. When the distributor (see figure B.2) is in a position that allows product to be ported “to” a piston chamber (see figure B.3), equal pressure is applied across both sides of the piston. Equal pressure applied across a piston offers zero resistance to the crankshaft (see figure B.5) via the piston’s connecting rod (see figure B.6). When the distributor (see figure B.2) is in a position that allows product to be ported “from” a piston chamber (see figure B.4), there is greater product pressure applied to the inside of the piston than to its outer side. The differential of pressure causes the piston to travel in an outward direction. As the piston travels in an outward direction, product is ported to the meter’s top collector and to its outlet. As a piston is forced in its outward direction, a rotational force is applied to the crankshaft via the piston’s connecting rod. This rotational force of the crankshaft is then applied to adjacent pistons, which offering zero resistance, allows them to be pulled in their inner direction easily. This allows product from the distributor to fill the piston chamber. The above process is repeated by all four pistons. A spring and pressurized countervalve (see figure B.7) employing a diaphragm imparts a downward thrust on the rotating distributor to seal its surfaces and prevent internal leakages which would result in unmeasured product being delivered.

Figure B



Notes

Power Distribution Board



Power Distribution Board Assembly - 110206

Board Functions:

- Incoming A.C. voltage filter (FIL1).
- Solid State Relay control for submerged pumps (K1, K2, K3, K4)
- Fuse protection for the system (F1, F2, F3, F4 -7)
- D.C. voltage distribution (J1)
- Battery charging circuit (J2)
- Connection to field wiring for motor out, card reader communication, and dispenser communication. (TS2,3,4 & 5)
- Provides a switch for the main power (S2)
- Provides a switch for the battery override (S3)

Power Distribution Board

Power Distribution Board Theory of Operation-

The Power Distribution board is located in the center of the dispenser in the electronics cabinet. This board is covered by a metal cover to protect anyone working inside the equipment from receiving an electrical shock. This cover is removed for service. It must also be replaced when service is complete.

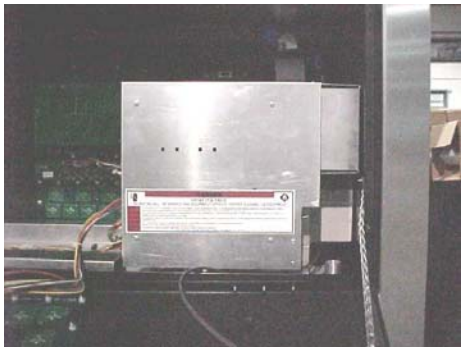


Figure 1 - Power Distribution Board with the protective cover on.

WARNING - Always replace the metal cover when you have completed service. Failure to do so poses a potential for electrical shock.

110– 230 Volts A.C. 50 or 60 cycle power comes into the dispenser through field wiring to the bottom of the Power Distribution Board terminal strip (TS1) 1. Power then passes through a 3 amp fuse and then is filtered for noise. Any electrical noise is dampened out by this filter FIL1. The power is then passed from the Power Distribution Board to the Power Supply (through connector J5) for Direct Current (D.C.) conversion.

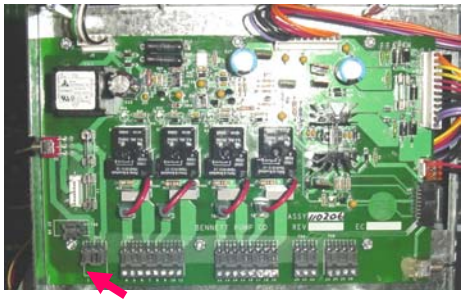


Figure 2 - Incoming power on terminal TS1 is line voltage. It passes thru fuse protection and a easy “Off/On” switch. Then it is filtered and sent over to the power supply.

Incoming A.C. voltage is also routed through fuse F1 (1 amp) for submerged pump control. If power to the dispensers are “cross phased” this fuse will blow to protect the dispenser from damage. If this fuse blows, check for cross phasing. If a cross phasing condition exists, correct the problem before attempting to replace the fuse.

Power from the power distribution board comes into the Power Supply assembly on connector J1. This power supply creates various D.C. Voltages for use throughout the system. Specifically, the power supply takes the 110– 230volt A.C. input to create the following voltages:

1) +24 Volts DC
2) +12 Volts DC
3) +5 Volts DC

These voltages have tolerances of +/- 10%. There are no adjustments for any of these voltages but there are test points.

The DC voltages are fed back to the Power Distribution board connector J4 through a multi-pin conductor connected to J2 of the Power Supply.

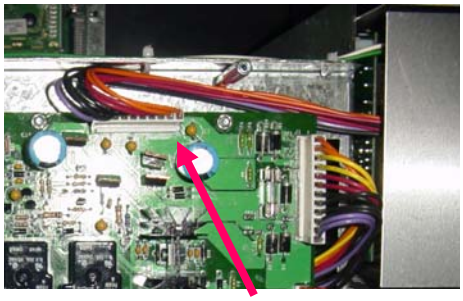


Figure 3 - DC voltages returns from the power supply to the power distribution board on connector J4.

Power Distribution Board

There is fuse protection on the Power Distribution Board for both power coming into the system and also fuse protection for power traveling internal to the system. From there the DC voltages are sent over to the CPU board through another multi-pin conductor from connector J1 of the Power Distribution Board to connector J7 on the CPU board. From this point the voltages are distributed to all other parts of the system.

Figure 4 - Pico fuses and standard replaceable fuses are located in the upper right of the Power Distribution Board . Also, connector J1 sends power over to the CPU.

Battery Backup— A separate rechargeable +12volt battery is connected to the Power Distribution Board. When the dispenser is in normal operation the battery is not used and is charged by the +14 volt D.C. battery charging circuit located on the Power Distribution Board. When main incoming power is removed from the system or when the system incoming AC voltage drops below 74 volts AC, the CPU detects this and the dispenser goes into "Power Fail" condition. At this point the battery supplies +12 volts DC for 30 seconds to the system or unless the battery override switch is closed. This battery over-ride switch allows the technician to eliminate the 30 second wait if he has to service the equipment. The battery itself is connected at the factory but requires several hours to charge. This battery has nothing to do with maintaining system programming in the event of a power outage. Make sure the battery is connected because the battery will eliminate the effect of momentary power sags thus making the dispenser more reliable.

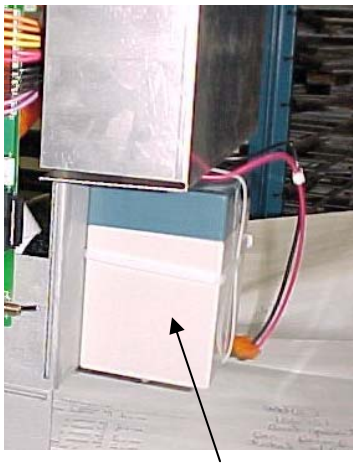


Figure 5 - External battery for maintaining display after loss of primary power. This battery is re-chargeable and takes several hours to charge on a brand new dispenser.

The Power distribution board has other functions as well. This board houses four relays that are used to route incoming line voltage as Motor "Out" signals to turn on remote submerged pump relays. These relays are controlled by +12 volt DC signals from the CPU board. When the CPU board wants to turn on a submerged pump, it sends a +12 volt dc signal to the proper relay turning it "On" and routing the line voltage the proper terminal on the terminal strips located at the bottom of the Power Distribution Board. This line voltage is connected to the STP relay inside the building by field wiring. When the CPU wants to turn "Off" a motor, it removes the +12volt dc signal which opens that relay. In the case of the blended product, more than one relay is activated at one time.

Figure 6 - Solid state relays provide motor control for the STP's or the Self Contained Motors. +12volts DC is used to turn them on.

Power Distribution Board

Dispenser communication with a Point of Sale and Card Reader communication is also routed through the power distribution board. Dispenser communication comes in from the model 515 box to the power distribution board terminal strip TS5. This is the current loop communication signal that passes through the Power Distribution Board on connector J3 through a ribbon cable to the CPU board connector J8.

Card reader communication also is routed through the power distribution board. Card reader information comes from the IC Box through twisted pair wiring (3 wires) and connects to terminal strip TS4. This is RS485 protocol. This information follows the same path through the power distribution board as the dispenser communication, that is, it exits the power distribution board through the same ribbon cable over to the CPU on connector J8.

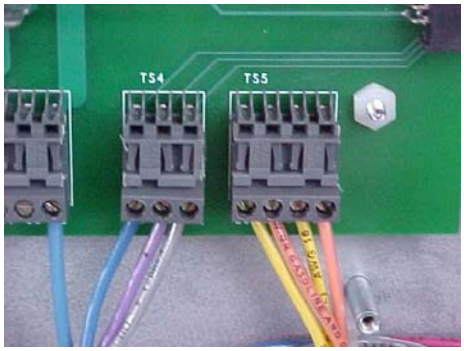


Figure 7 - TS4 is the Dispenser Card Terminal Connection to the IC Box in the building and TS5 is the Fuel Communication to the 515 box.

Description of Power Control -
Warning - The only option that you have for removing power from the dispenser is by turning off the S2 switch from the Power Distribution Board.

- **Switch 3 (S3)-** Located on the bottom right hand side of the board is the Battery Over-ride Switch. This switch can be used to override the 30 second battery if primary power is lost at the dispenser or if incoming power drops below 74 volts A.C. This switch Stays in the up position by a spring. To "kill" the power you must press down momentarily and then release. Once the switch is closed and the display goes blank remove your finger from the switch. See figure 8.

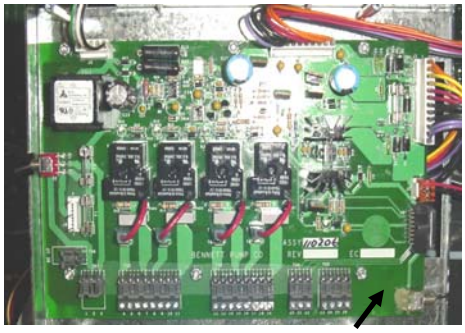


Figure 8 - S3 is a switch which is normally opened. Always turn off the battery when attempting to service the Pacific dispenser.

Power Distribution Board

PAD Jumpers - There are a series of PAD jumpers located below the solid state relays. These PAD jumpers should not change in the Pacific dispenser. If these PAD jumpers are not set correctly improper system operation will result and you may possibly blow fuse F1. For proper operation connect the PAD jumpers as follows:

For submerged pumps:
Product A - PAD 4 connected to T1
Product B - PAD 3 connected to T3
Product C - PAD 2 connected to T5
Product D - PAD 1 connected to T7

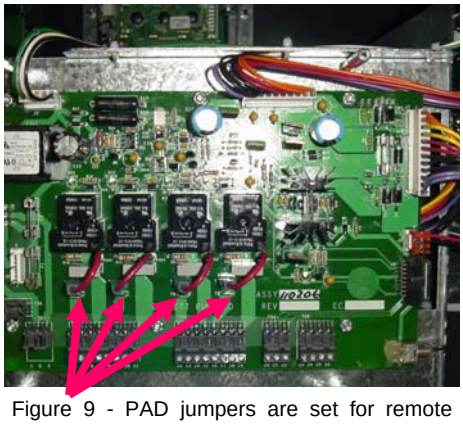


Figure 9 - PAD jumpers are set for remote submerged pumps. They are connected to the top row of pads.

Relays - Relays are controlled with +12 volt D.C. control signals from the CPU:

Relay K1 - Product A - LED D15
Relay K2 - Product B - LED D16
Relay K3 - Product C - LED D9
Relay K4 - Product D - LED D6

Figure 10 - Do Not Change the PAD jumper. This is for Self Contained pumps, which is Not an option with the Pacific dispenser.

Note: Anytime you see a relay LED “lit” you can assume the relay is “turned on”.

Figure 11 - LED “Lit” means the CPU is telling the relay to turn on.

Power Distribution Board

Fuses - A series of fuses are located on the Power Distribution Board. There are two types, standard and Pico. The standard fuses are located in standard fuse mounts whereas the Pico fuses are soldered onto the board. The fuses are used as follows:

Standard Fuses

F1 - 3 amp standard blow for system power
F2 - 1 amp standard blow for submerged pump control
F3 - 1 amp for battery charging circuit.

Pico Fuses -

F4 - F5 - (3.25 amp) +24 volt D.C. circuit side 1 and side 2
F6 - (3.25 amp) +14 volt D.C. battery charging circuit
F7 - (3.25 amp) +12 volt D.C. circuit side 1 and side 2
F8 - (3.25 amp) +5 volt D.C. logic power

Note - Contact Technical Support before replacing a Pico fuse.

Light Emitting Diodes - There are several LED's located on this board. They are described as follows:

LED D15 - Motor "A" power. If illuminated means the solid state relay for the "A" submerged pump motor is energized.

LED D12 - Motor "B" power. If illuminated means the solid state relay for the "B" submerged pump motor is energized.

LED D 9 - Motor "C" power. If illuminated means the solid state relay for the "C" submerged pump motor is energized.

LED D 6 - Motor "D" power. If illuminated means the solid state relay for the "D" submerged pump motor is energized.

LED D 7 - Recall. If illuminated means that the Recall button has been activated.

LED D14 - Power Fail. If illuminated means that the system has lost primary power or that incoming power has dropped below 75 volts A.C.

System Battery (P/N 105908)- A +12 volt rechargeable battery is supplied with the dispenser. The battery has a charging circuit and must be charged for several hours before it has a full charge. The battery is used to supply DC voltage (+12volt D.C.) to the dispenser if the dispenser looses primary power or if primary power drops below 75 volts D.C. The battery, when in use, provides power for 30 seconds and then times out. The battery override switch is located on the right hand side of the Power Distribution board. It is used to bypass the 30 second battery "On" time. If the system is on battery and you want to override it, push down on switch F1. It will disconnect the battery circuit. Note - Always make sure the battery has been bypassed when servicing the equipment.

Powering down the dispenser for Service - To remove power from the dispenser for service follow this procedure - Power down the dispenser by turning off S2 from the Power Distribution board. The display lights should go off and a message on the display should read "PFAIL". This message will blink for 30 seconds OR until the battery override switch is closed (S3 on the Power Distribution Board).

Turning the dispenser back on - Turn on S2 from the Power Distribution Board.
Note: Always replace the metal cover for the Power Distribution Board after finishing your service work. This will help protect any un-trained store personnel from voltages if they open the electronic head of the dispenser.

Power Distribution Board

Taking Voltage Readings -
When taking voltage readings it is important to have a good voltage "reference". Without a good reference, the voltage reading that you measure may be wrong. There is a difference between an AC voltage reference and a DC voltage reference.

Figure 12 – Using incoming ground for measuring AC voltages.

AC Voltage reference - When measuring an A.C. voltage the best voltage reference that you can use is the incoming ground wire connected to terminal one on TS1 on the lower left edge of the Power Distribution Board on side 1 of the dispenser (see figure 12).

DC Voltage reference - When measuring D.C. Voltages rather than looking to hook your test lead up to a board component, a good place to put your black lead on any black wire connection on the multi-pin, multi-colored connector J3 on the upper right side of the Power Distribution Board.

Voltage Tolerances - When taking voltage readings the (+/-) tolerance of any reading is (+/-) 5%. There are no adjustments that can be made on any voltages from the Power Supply. If the voltage is out of range, replace the power supply.

Measuring fuses - There are two ways to see if a fuse is good. Either visually or by measuring it using a multi meter. To measure the fuse put your meter on the "ohms" scale or "continuity". If the fuse is good you should hear a "beep" when you put your leads across the fuse. This means the fuse is good. If it reads anything other than 0 ohms or "continuity" the fuse is probably bad and needs to be replaced. This test works for replaceable fuses and Pico fuses as well.
Note: Always measure fuses with the dispenser power off.
Note: When replacing a fuse always replace with the same type and size. The rating of the fuse is written on the fuse. If in doubt about the rating of any fuse in the system call Bennett Technical Support.

Power Distribution Board

Important voltage tests - A couple of important voltage tests that our Technical Support Department may want to have you check are as follows:

Incoming power - Measure for A.C. Voltage between terminal 3 and terminal 2 (Hot to Neutral). The measurement should be recorded before calling Technical Support (see figure 13).

Figure 13 - This example shows measuring incoming power of 120 volts A.C. to the dispenser.

Also measure between the ground and the neutral with your meter on the A.C. scale. You should see approximately zero volts (see figure 14).

Figure 14 - Measuring for “stray” voltage between Neutral and Ground. Should be zero volts.

Neutral to Ground - Also, an important reading is to make sure that the resistance from the neutral to the ground is less than 1 ohm. Take this measurement with the multi-meter on the ohms scale and with the ***field wires disconnected*** from the board. Notice that the field wires connect to quick “disconnect” type terminals (see figure 15).

Note: Make sure the dispenser power circuit (Breaker Panel) has been turned “off” before taking this measurement.

It is important to mark this measurement down on your Audit Report for each installation.

Figure 15 - With the field wires disconnected from the board measure the resistance between neutral and ground. It should be 1 ohm or less. This means that the neutral and the ground are at the same potential.

Power Distribution Board

Terminal Strips, Connectors and Pinouts - The following is a description of the connections to the terminal strips, and pinouts of all the connections on the Power Distribution Board.

Note: Voltage readings can be taken right on the terminal strip connector pins.

Terminal Strip 1 (TS1) - Dispenser Input Power

- Pin 1 - Earth Ground
- Pin 2 - Neutral
- Pin 3 - Incoming Line Voltage (110v - 230 v AC @ 50 or 60 Hz)

Terminal Strip 2 (TS2) - Motor Power Products "A" and "B"-

- Pin 4 - Not used
- Pin 5 - Not used
- Pin 6 - Not used
- Pin 7 - Submerged pump relay control product "A"
- Pin 8 - Not used
- Pin 9 - Not used
- Pin 10 - Not used
- Pin 11 - Submerged pump relay control product "B"

Terminal Strip 3 (TS3) - Motor Power Products "C" -

- Pin 12 - Not used
- Pin 13 - Not used
- Pin 14 - Not used
- Pin 15 - Submerged pump relay control product "C"
- Pin 16 - Not used
- Pin 17 - Not used
- Pin 18 - Not used
- Pin 19 - Not used

Terminal Strip 4 (TS4) - Dispenser Card Reader Terminal (DCT)- RS 485 Communication

- Pin 20 - (+)Data (RS485) for card reader terminal from dispenser to IC Box (+) terminal
- Pin 21 - Data Common from dispenser to IC Box Common terminal
- Pin 22 - (-) Data (RS485) for card reader terminal from dispenser to IC Box (-) terminal

Terminal Strip 5 (TS5) - Dispenser Communication Current Loop Signals - There are 2 Current Loop wires per SIDE of a dispenser. On a two sided dispenser side 1 communication is on terminals 23 and 24 and side 2 communication is on terminals 25 and 26. These wires are pulled from the model 515 box inside the building and are connected to the dispenser here. Pay attention to polarity. Make sure to connect the (+) in the dispenser to the (+) in the 515 etc. Notice that the first terminal in the dispenser is data (-) for side 1.

- Pin 23 - (-)Data side 1 out to model 515 box (-) for the first Fueling Point
- Pin 24 - (+)Data side 1 out to model 515 box (+) for the first Fueling Point
- Pin 25 - (-)Data side 2 out to model 515 box (-) for the second Fueling Point
- Pin 26 - (+)Data side 2 out to model 515 box (+) for the Second Fueling Point

Power Distribution Board

Terminal Strip 6 (TS6) - Constant 120 AC Connection—Note that this is a constant 120vac.

- Pin 1 - Neutral (top)
- Pin 2 - Incoming Line Voltage (110v - 230 v AC @ 50 or 60 Hz)

J1 - DC voltages from the Power Distribution Board to the CPU board - Multi colored cable

- Pin 1 - 24 Volts d.c.. Used for Backlights, Printer and Valve Control side 1. Orange wire.
- Pin 2 - 24 Volts d.c.. Used for Baclkights, Printer and Valve Control side 2. Orange wire.
- Pin 3 - Standby. (14.5 volts d.c. battery backup) side 1. Yellow wire.
- Pin 4 - Standby. (14.5 volts d.c. battery backup) side 2. Yellow wire.
- Pin 5 - 12 Volts d.c. Used for display board, operator interface board, local preset side 1. Red wire.
- Pin 6 - 12 Volts d.c. Used for display board, operator interface board, local preset side 2. Red wire.
- Pin 7 - DCC - Direct Current Common or Ground Reference. Black wire.
- Pin 8 - DCC - Direct Current Common or Ground Reference. Black wire.
- Pin 9 - DCC - Direct Current Common or Ground Reference. Black wire
- Pin 11 - +5 Volts d.c. CPU logic power - Violet wire side 1.
- Pin 12 - +5 Volts d.c. CPU logic power - Violet wire side 2.

J2 - Battery Charging Circuit - When main power is on the battery charging circuit provides +14.1 Volts d.c. to charge the battery. When the battery is “On” the battery supplies +12.6 volts d.c. for the system.

- Pin 1 - +14.1 volts battery charging. +12.6 volts battery on.
- Pin 2 - Direct Current Common (DCC)or ground reference
- Pin 3 - Not Used

J3 - Grey ribbon cable that connects the CPU to the Power Distribution Board. This cable mainly handles the card reader communication and dispenser communication from the CPU to the Power Distribution Board.

- Pin 1 - (identified by the red tracer) Suicide signal. The CPU uses this signal to turn off the battery after 30 seconds in case of power failure. Normal reading is +5 volts d.c.
- Pin 2 - RS 485 (-) - Card Reader communication with console (-)
- Pin 3 - Recall - Used by the CPU / Product Select Keypad to turn on dispenser buttons to read totals. Normal reading is +5volts d.c.
- Pin 4 - RS485 Common - Card Reader communication with console common
- Pin 5 - Power Fail - Signal from power distribution board indicating loss of power or less than 75 volts A.C. Normal reading is +5 volts d.c.
- Pin 6 - RS485 (+) - Card Reader communication with console (+)
- Pin 7 - Ground
- Pin 8 - Ground
- Pin 9 - Motor “A” - Motor relay control signal. +12vdc represents “motor on”. Ovdc represents “motor off”.
- Pin 10 - Current Loop (+) side 2. Fuel channel communication with the 515 interface box.
- Pin 11 - Motor “B” - Motor relay control signal. +12vdc represents “motor on”. Ovdc represents “motor off”.
- Pin 12 - Current Loop (-) side 2. Fuel channel communication with the 515 interface box.
- Pin 13 - Motor “C” - Motor relay control signal. +12vdc represents “motor on”. Ovdc represents “motor off”.
- Pin 14 - Current Loop (+) side 1. Fuel channel communication with the 515 interface box.
- Pin 15 - Motor “C” - Motor relay control signal. +12vdc represents “motor on”. Ovdc represents “motor off”.
- Pin 16 - Current Loop (-) side 1. Fuel channel communication with the 515 interface box.

Power Distribution Board

J4 - D.C. Voltages created by the Power Supply and sent to the Power Distribution Board

- Pin 1 - 5 volts d.c. Logic Power for the CPU. Violet wire.
- Pin 2 - 5 volts d.c. Logic Power for the CPU. Violet wire.
- Pins 3-6 - Direct Current Common (DCC) Ground Reference. Black wires.
- Pin 7 - +12 volts d.c. Power for display board, operator interface board, local preset side 1. Red wire.
- Pin 8 - +12 volts d.c. Power for display board, operator interface board, local preset side 2. Red wire.
- Pin 9 - +24 Volts d.c.. Used for Backlights, Printer and Valve Control side 1. Orange wire.
- Pin 10 - +24 Volts d.c.. Used for Backlights, Printer and Valve Control side 2. Orange wire.

J5 - Filtered A.C. 110 - 230 volts A.C. 50/60 cycle from power distribution board from Power distribution to the Power Supply

- Pin 1 - Earth Ground. Green wire.
- Pin 3 - Neutral. White wire
- Pin 5 - 110 - 230 volts A.C. 50/60 cycle**.** Black wire.

J6 - Non-filtered A.C. 110-230 volts A.C. 50/60 cycle. Note that this is switched.

- Pin 1 - Earth Ground.
- Pin 2 - Neutral.
- Pin 3 - Hot (top).

Power Supply

Power Supply Assembly

Power Supply Assembly Part Number—105512

Board Functions -

- Creates Direct Current (DC) voltages from Alternating Current (AC) voltages

Power Supply Assembly Theory of Operation -
AC power 110– 230 volts AC 50/60 cycle comes from the Power Distribution board on Power Supply Assembly connector J1.
The purpose of the power supply is to take incoming AC and convert it to various DC voltages for use throughout the system. After creating these voltages it sends them to the Power Distribution Board for distribution throughout the system. The DC voltages created are:

- +24 volts DC for use with the valves, the receipt printer power, the display and the backlighting
- +12 volts DC for use with the Product select board, Card Reader power, Pulser and Handle circuitry and the solid state relays.
- +5 volts DC for the CPU logic voltage.

Description of Controls - There are no controls on the Power Supply Assembly

LED's - There are no LED's on this assembly

Fuses - There are no fuses on this assembly

Voltage Adjustments - There are no voltage adjustments on this assembly. If the output voltages are not within (+/-) 10% of the rated voltage, replace the power supply.

Power Supply

Taking voltage readings (Continued) - Next, you can measure power from the Power Distribution Board to the CPU board. You can measure using the same technique.

Note - Color Coding - In the 708 electronics, most of the voltages and wires are color coded, but not always. In most cases the colors are as follows -
Orange- +24 Volts DC
Red - 12 Volts DC
Violet - +5 Volts DC
Black - DC Common

With the dispenser power on locate connector J1 on the top right (vertical) of the Power Distribution Board.

+24 volts - Putting your black (negative) lead on any of the black wires and your red (positive) lead on either of the orange wires, measure for +24 volts dc. There are 2 orange wires, one for side 1 and one for side 2. Both should have +24 volts (+/- 5%).

+14 volts - Putting your black (negative) lead on any of the black wires and your red (positive) lead on either of the yellow wires, measure for +14 volts dc. There are 2 yellow wires, one for side 1 and one for side 2. Both should have +14 volts (+/- 5%).

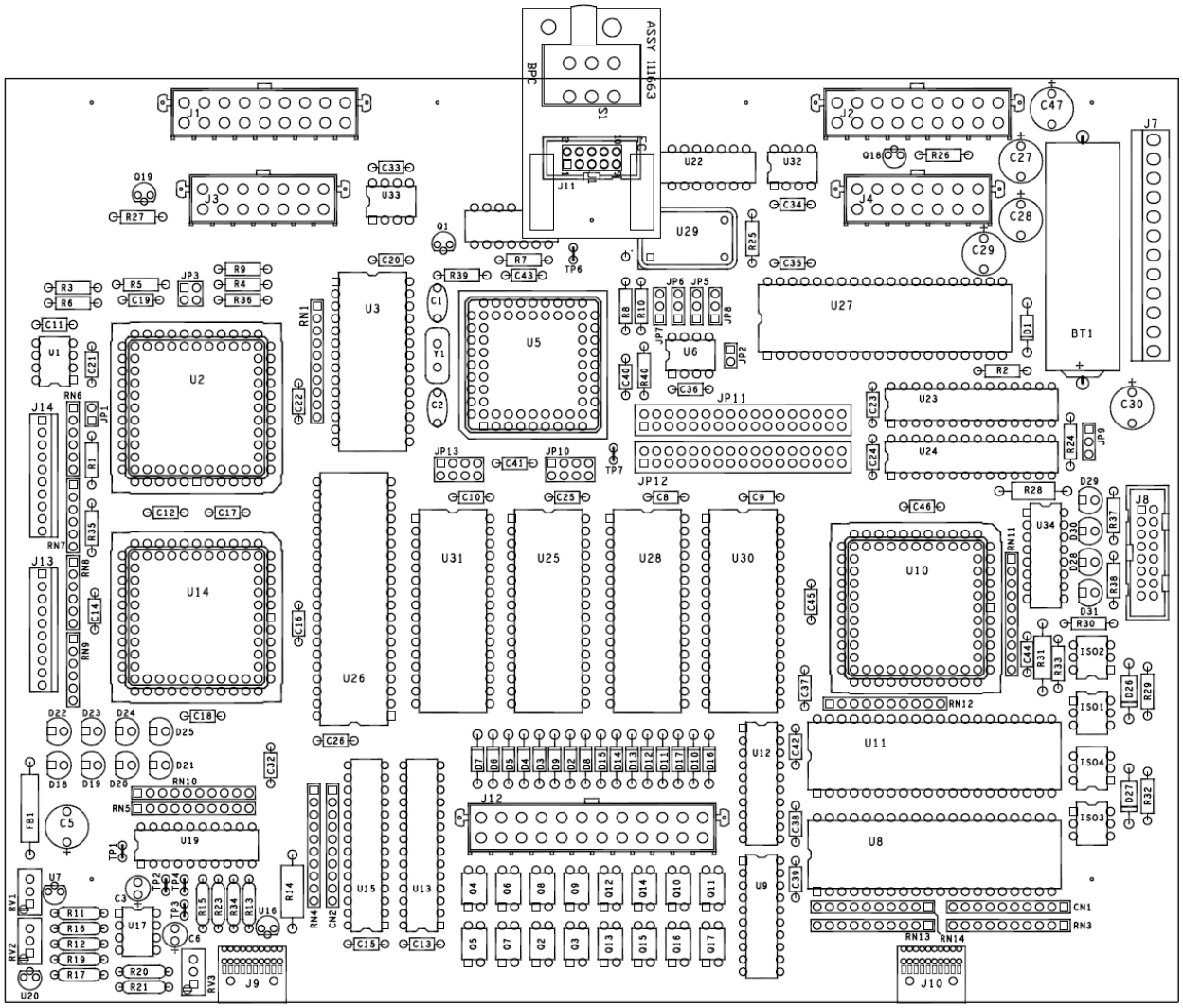
+12 volts - Putting your black (negative) lead on any of the black wires and your red (positive) lead on either of the red wires, measure for +12 volts dc. There are 2 red wires, one for side 1 and one for side 2. Both should have +12 volts (+/- 5%).

+5 volts - Putting your black (negative) lead on any of the black wires and your red (positive) lead on the violet wire, measure for +5 volts dc. There is 1 violet wire. It should read +5 volts (+/- 5%).

If any of these voltages are out of range, you may experience erratic performance and it may be necessary to replace the Power Supply. Call Technical Support for assistance 1-800-423-6638.

Notes

CPU Board



CPU Board Assembly Part Number - 110185

Board Functions:

- Runs Software
- Contains Memory (RAM)
- Communicates with the Point of Sale
- Controls the Solid State Relays
- Sends display signals to the Display Board
- Interfaces with the Handles and Pulsers
- Controls all the Blending Functions
- Valve Control
- Stores historical data for sales and diagnostics
- Contains back up battery for programming information

CPU Board

Theory of Operation— The CPU board is the heart of the system. It runs the software, has the memory, communicates with Point of Sale, sends control signals to the solid state relays, sends display signals to the display boards, communicates with the touch pad, interfaces with the handles and pulsers through the Intrinsically Safe Barrier Boards, controls the blend valves through a wiring harness. It performs the blending functions, and stores historical data for sales and diagnostics. It receives power from the Power Distribution Board and also routes power to the card reader system. It also communicates with and sends and receives signals from the Vapor Recovery system. It also contains backup battery for maintaining programming in the RAM during power outages.

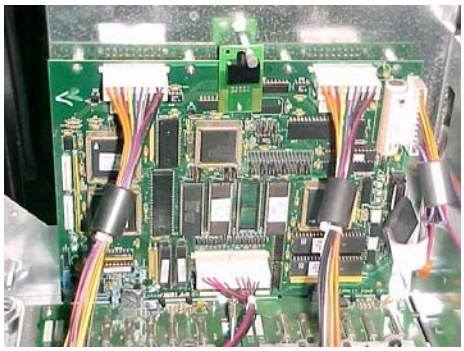


Figure 1 - CPU Board

There is one CPU board per dispenser. The CPU board is mounted vertically and has various cables and harnesses connected to it.

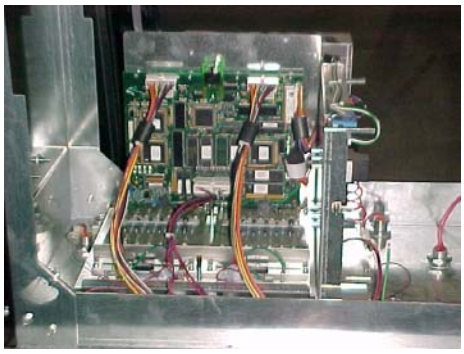


Figure 2 - CPU Board plugged in.

The CPU board receives dc voltages from the power distribution board on connector J7. The wiring harness is color coded and uses the following color scheme:

1) Orange - +24vdc - Valve, printer, display and backlighting
2) Yellow- +14vdc - Battery charging circuit
3) Red - +12 - Product select, Card reader, Pulsers, Handles and Solid State Relays
4) Black - dcc - Reference for all DC voltages
5) Violet - +5vdc - System logic voltage used by the CPU

The CPU board is physically mounted to the Intrinsically safe barrier modules. The CPU must be removed to remove either of the Intrinsically Safe Barriers.

Figure 3 - The DC power comes from the Power Distribution board to connector J7 of the CPU.

CPU Board

Communication with the Point of Sale - Current Loop communication is routed from the Point of Sale through the Bennett model 515 box. From the model 515 box the dispenser communication channel is connected by two field wires for each side of the dispenser. So, a dual sided dispenser will have 4 field wires connected between the dispenser communication channel (connector TS 5) on the Power Distribution Board and the terminal strip of the 515. This communication allows the dispenser to "talk" to the Point of Sale device. The Point of Sale (POS) must be able to talk to each fueling point to gather data, so that the POS can download prices, authorize the dispenser, find out what "state" the dispenser is in (handle down idle, handle up calling, dispensing , total sale amount, etc..). The current loop connection on TS5 is polarity sensitive, so make sure the (+) and the (-) go to the proper terminals. Terminal 23 is side 1 (-), 24 is side 1 (+), 25 is side 2 (-), and 26 is side 2 (+).

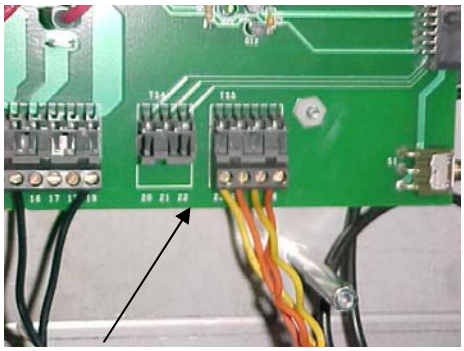


Figure 4 - Current Loop wires connects the 515/POS to the pump. These signals are routed to the CPU board.

From the Power Distribution Board the communication signals are routed through a ribbon cable on connector J3 on the Power Distribution Board to connector J8 of the CPU board. There are LED's on the CPU board for this channel that are marked "Receive" and "Transmit". These LED's will normally "blink" if the CPU is talking to the POS. The dispenser will only talk to the POS if it is in "Console" mode. If it is in "Standalone" or "Programming" mode it will halt communication and you will see the LED's stop blinking. Dispenser communication with the console is on a "speak when spoken to" arrangement. The POS always initiates the communication with the dispenser. Also, only one dispenser communicates with the POS at a time. The POS "polls" each fueling point individually, one at a time and then moves to the next fueling point. After it talks to the last fueling point it starts over again.

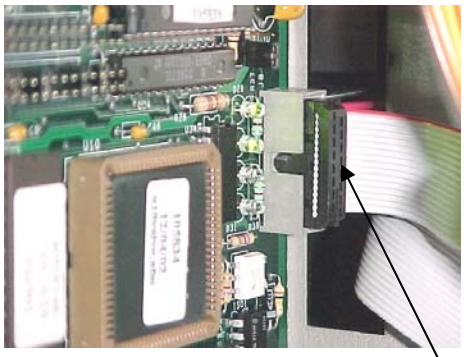


Figure 5 - Console com comes in on the ribbon cable. There are LEDs right next to the connector to indicated side 1 and side 2 transmit and receive with the console.

Solid State Relay Motor Control - The CPU sends the +12volt DC signals to the solid state relays that are located on the Power Distribution Board through this same ribbon cable.

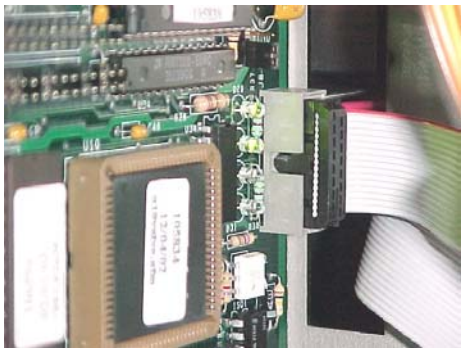


Figure 5A - Motor control between the CPU and the Power Distribution board is also through this ribbon cable.

CPU Board

Communication with the Card Reader System - Bennett installs the card reader in the electronic head of the dispenser. There is one card reader and printer per side. The dispenser provides power for the card reader and printer and routes card reader communication from the card reader to the CPU board and then (through the Power Distribution Board) to the terminal strip on the Power Distribution board TS4. Here on TS4 is the 3 terminal connector that connects the dispenser card reader channel with the Bennett IC box in the store using RS485 twisted pair field wiring communication. And from the IC box to the POS using RS232 communication.

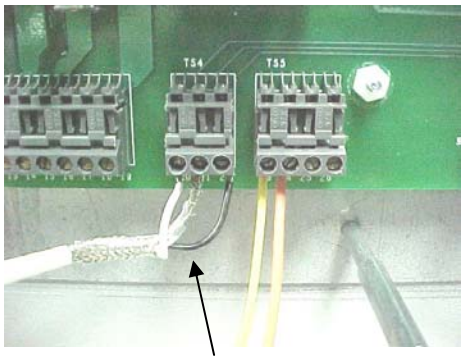


Figure 6- Card reader communication comes in from the IC box on TS4. It then goes to the CPU board on the same ribbon cable as the console communication

The communication for the card readers between the CPU and the Power Distribution Board is through the same ribbon cable as the dispenser communication. It exits the CPU on connector J8 and enters the Power Distribution Board on J3. It exits the board on Terminal Strip TS4.

Communication with the Handle Switches - When the customer removes the nozzle from the nozzle boot, a small electronic circuit is activated sending a signal through the Intrinsically Safe Barrier to the CPU. This signal is dependent on the jumper setting on the circuit board. The CPU interprets this voltage as the identifier for the handle. That is, it sees it as Handle “A” or “B”. If the jumper setting is wrong then the handle switch will not call in correctly.

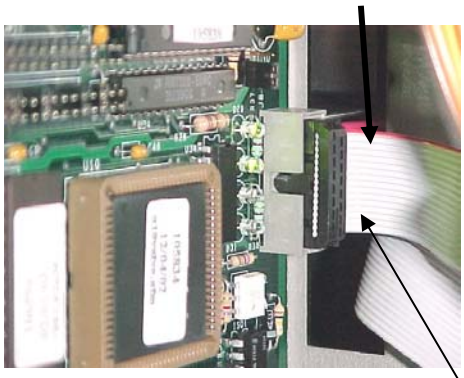


Figure 7 - Ribbon cable handles DCT and console com information.

Communication with the Pulsers - The dual phase pulsers put out two phases of pulses 90 degrees out of phase with one another. 1024 pulses counted by the CPU equals one United States Gallon. As the pulser outputs pulses, those signals are sent through a daisy chained ribbon cable to all other pulsers for that side and up and through the Intrinsically Safe Barrier module to the CPU.
The CPU performs the mathematical calculations to convert pulses to volume and then from volume to currency and send the volume and currency information to the Display Board on a real time basis.

System Software - Two system Programmable Read Only Memory (EPROM’s) chips run the dispenser operating program. These chips are located in slots U25 and U30. The chips have markings on them that describe the software revision level (which can also be seen in diagnostics), the Bennett Part Numbers and the Day Code of the chips. These are replaceable chips, but should not be replaced by untrained personnel.

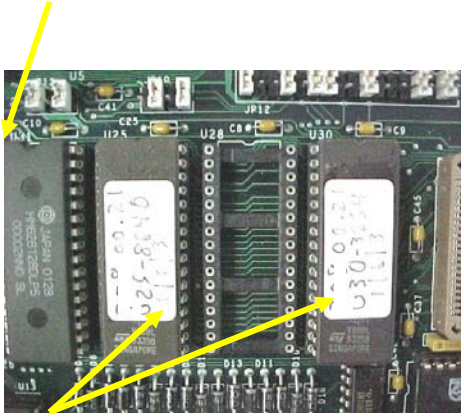


Figure 8 - System software - 2 EPROM's located in slots U25 and U30.

CPU Board

System Memory (RAM) - The CPU board contains 128K of non volatile RAM. The RAM is the area of the microprocessor that does all of the calculations. It is sometimes referred to as the “scratch pad” or “chalk board” because it keeps getting written to and erased. For information on clearing the RAM see section later in this chapter.

Figure 9 - CPU battery is a +3.6 volt battery. This battery maintains programming if power is lost. It cannot be replaced. If the battery goes bad the CPU board must be replaced.

On Board Battery - There is a +3.6 volt dc Ni-cad battery that is used by the RAM chip to store all of the programming information if the dispenser is programmed and looses power. This battery is soldered right onto the CPU board. It should maintain programming for extended and prolonged periods of power outage. If the dispenser looses programming during a power outage, then the battery is bad. The CPU board must be replaced. You cannot replace just the battery.

Communication with the touch panel (customer keypad) - The Pacific dispenser uses a capacitive type customer product select switch. This is not a normal dry contact, normally open series of switches like most of the competitors have historically used. This keypad is used as the “start” button or a “grade select” button. The CPU contains the buffer address information for this product select keypad. The keypad uses capacitive technology and has no dry contact type switches. That is, when the customers finger gets in proximity to the sensor, the key is triggered. The addressing information of the keypad is kept by the CPU.
Diagnostics can be run to show what the function of all buttons on the keypad are for.

Figure 10 - Product Select Keypad Overlay

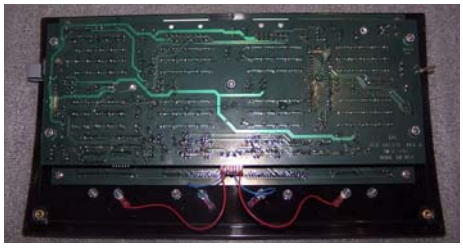


Figure 11 - Reverse side of the Product Select Board

CPU Board

Communication with the Local Preset - Bennett makes a Local Preset system that can be installed on the dispenser. This system is used by Full Service attended locations for presetting the dispenser to pump a preset amount of volume or currency. When this system is in place the Local Preset electronics communicates with the dispenser CPU so that the dispenser can open and close the valves properly for the preset amount of fuel. This communication goes from connector J4 (or) J5 on the local preset through a multi-conductor cable to the product select board J2 connector, out of the product select board on J1 connector to the J2 connector (side 1) of the CPU or J1 connector (side 2) of the CPU.

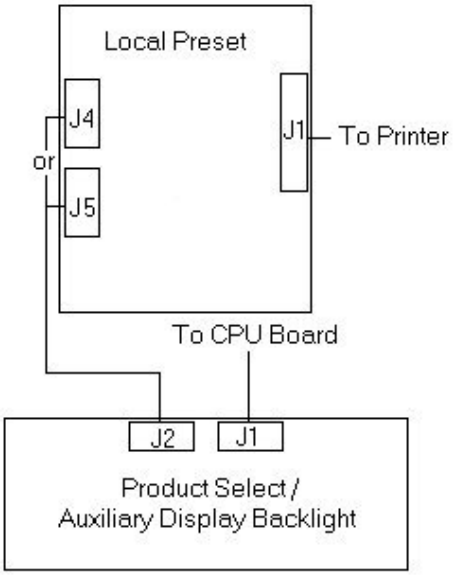


Figure 12 - Local Preset is an option that is purchased for Full Service locations. It gets its power and data from the dispenser. It connects to the dispenser CPU through a daisy chain (multi-colored cable) thru the product select.

Troubleshooting the Local Preset - There is very little troubleshooting available with the Local Preset Board. Under normal circumstances, if this board fails, replace it. There are no Test Point references nor Diagnostics available to help troubleshoot any potential problems.

Display Contrast - If the display is hard to view than you can adjust the contrast by removing the glue applied by the factory and, using a small straight screwdriver, adjust the RV1 until you have the desired contrast (see figure 13). Once you have adjusted the contrast you must re-seal RV1 with glue.

NOTE: The contrast will adjust the letters / numbers on the screen, not the backlighting!

Power Fail circuit - The CPU also detects when power has been removed from the system or when the voltage input has dropped below 75 volts A.C. At that point the CPU enables the power fail circuit, turns off the dispenser lights and sends a message to the display of "PFAIL". This turns on the battery which provides 30 seconds worth of power to the display until it times out.

Power On Self Test - When the dispenser is turned on the CPU runs a diagnostic routine. This is why all of the solid state relays cycle on and off momentarily every time you turn on power to the dispenser.

Description of controls - There are no controls on this board.

Figure 13 - RV1 is used to adjust the contrast of the letters / numbers on the screen for the Local Preset display not the backlight.

CPU Board

Light Emitting Diodes -

Handle Switch LED's - Located towards the lower left of the CPU board.
LED D18 - Pump Handle side 1 product "A" - This LED is lit when the handle is hung up. Unlit when the handle is lifted .
LED D19 - Pump Handle side 1 product "B" - This LED is lit when the handle is hung up. Unlit when the handle is lifted
LED D20 - Pump Handle side 1 product "C" - This LED is lit when the handle is hung up. Unlit when the handle is lifted (Not Used—should remain on at all times)
LED D21 - Pump Handle side 1 product "D" - This LED is lit when the handle is hung up. Unlit when the handle is lifted (Not Used—should remain on at all times)
LED D22 - Pump Handle side 2 product "A" - This LED is lit when the handle is hung up. Unlit when the handle is lifted
LED D23 - Pump Handle side 2 product "B" - This LED is lit when the handle is hung up. Unlit when the handle is lifted
LED D24 - Pump Handle side 2 product "C" - This LED is lit when the handle is hung up. Unlit when the handle is lifted (Not Used—should remain on at all times)
LED D25 - Pump Handle side 2 product "D" - This LED is lit when the handle is hung up. Unlit when the handle is lifted (Not Used—should remain on at all times)

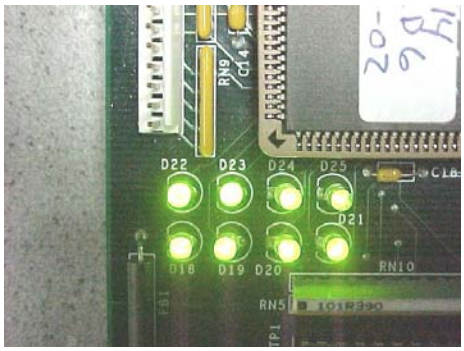
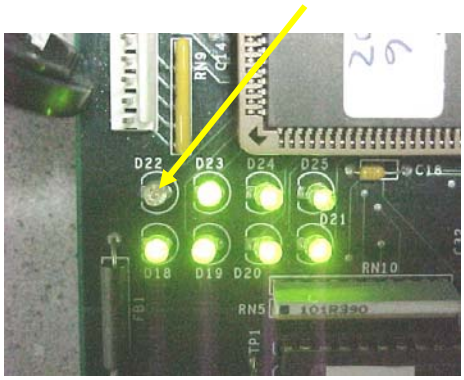


Figure 14 - Handle switch LEDs tell you if the CPU recognizes the handle switch. If a handle is lifted, the light goes out. See below



Communication LED's - These LED's are located on the right side middle of the CPU board.
LED D28 - Dispenser communication "receive" for side 1. Communication with the Point of Sale
LED D29 - Dispenser communication "transmit" for side 1. Communication with the Point of Sale
LED D30 - Dispenser communication "receive" for side 2. Communication with the Point of Sale
LED D31 - Dispenser communication "transmit" for side 2. Communication with the Point of Sale

* If it is communicating with the console these LED's are constantly blinking. If not communicating with the POS then the "Transmit" LED for that side will be on constantly and the "Receive" LED will be off.

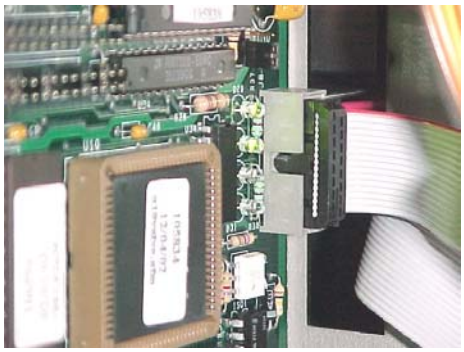


Figure 15 – The LEDs right next to the com cable are green. The top 2 are transmit and the bottom two are receive (side 1/2). They should "blink" if dispenser is talking to the POS.

CPU Board

Test Points -

Test Point TP1 - This is the voltage for the handle circuit side 1. Depending on what handle is lifted will be a different voltage for the handle detect circuit. The expected voltages for the different handles are as follows:

- Handles Off (side 1) - 3.00vdc
- Handle A - 2.790vdc
- Handle B - 2.730vdc

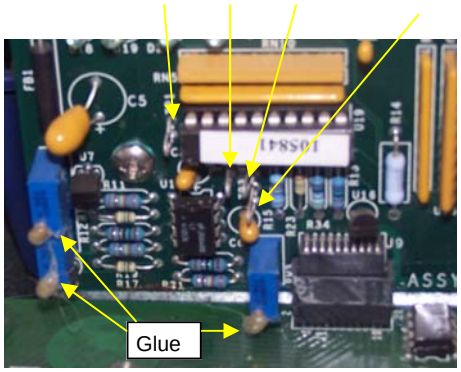


Figure 16 - Test Point 1 - 4

There is a potentiometer that can be used to adjust the bias set point voltage to 3.000vdc if necessary. This is not normally done in the field. The potentiometer is RV1for TP1. This is done with all handles hung up for that side.

Note: It should never be necessary to adjust the potentiometer for the voltage for the handle switches. Contact Technical Support before making any adjustments on this potentiometer. 1-800-423-6638.

Test Point TP2 - This is the voltage for the handle circuit side 2. Depending on what handle is lifted will be a different voltage for the handle detect circuit. The expected voltages for the different handles are as follows:

- Handles Off (side 2) - 3.00vdc
- Handle A - 2.790vdc
- Handle B - 2.730vdc

There is a potentiometer that can be used to adjust the bias set point voltage to 3.000vdc if necessary. This is not normally done in the field. The potentiometer is RV2 for TP2. This is done with all handles hung up for that side.

Test Point TP3 - 3.000vdc

WARNING! - Do not attempt to adjust these voltages in the field unless instructed to do this by Technical Support.

Test Point TP4 - 1.889vdc

Test Point TP6 - Direct Current Common or DCC (ground)

Test Point TP7 - CPU Logic Voltage 5.0vdc

CPU Board

RAM Clear Procedure - Sometimes it may be necessary to perform a "RAM Clear" procedure. This is a procedure that should only be done after all other logical troubleshooting steps have been exhausted. It is used sometimes if the dispenser software stops operating. Or, if the main memory gets corrupted or invalid. This procedure will clear the memory.

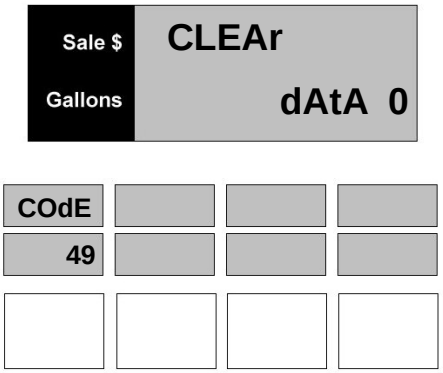


Figure 17

Caution - Some dispenser programming may be lost after the RAM clear and system reprogramming will be required.

Caution - This procedure will zero out electronic pump totals.

Caution - Do not show your customer how to do this procedure. This procedure should only be performed by factory trained personnel.

Note: RAM clear procedure is not a warranted procedure unless Technical Support is contacted and recommends it.

To perform a RAM clear:
Please refer to the Pacific's Operator's manual for the procedure. Menu Code 49 will RAM Clear the dispenser (see figure 17).

Note - An indication of a successful RAM clear will be when you turn the dispenser back on and all zeros are displayed for the last sale.

Note - Clearing the RAM does NOT change all the programming to the factory default settings. You may notice some programming remaining the same and other settings changing. It is best to review your program settings before performing the RAM Clear so that you know how to reset them after the RAM Clear. Some things the RAM clear resets is:

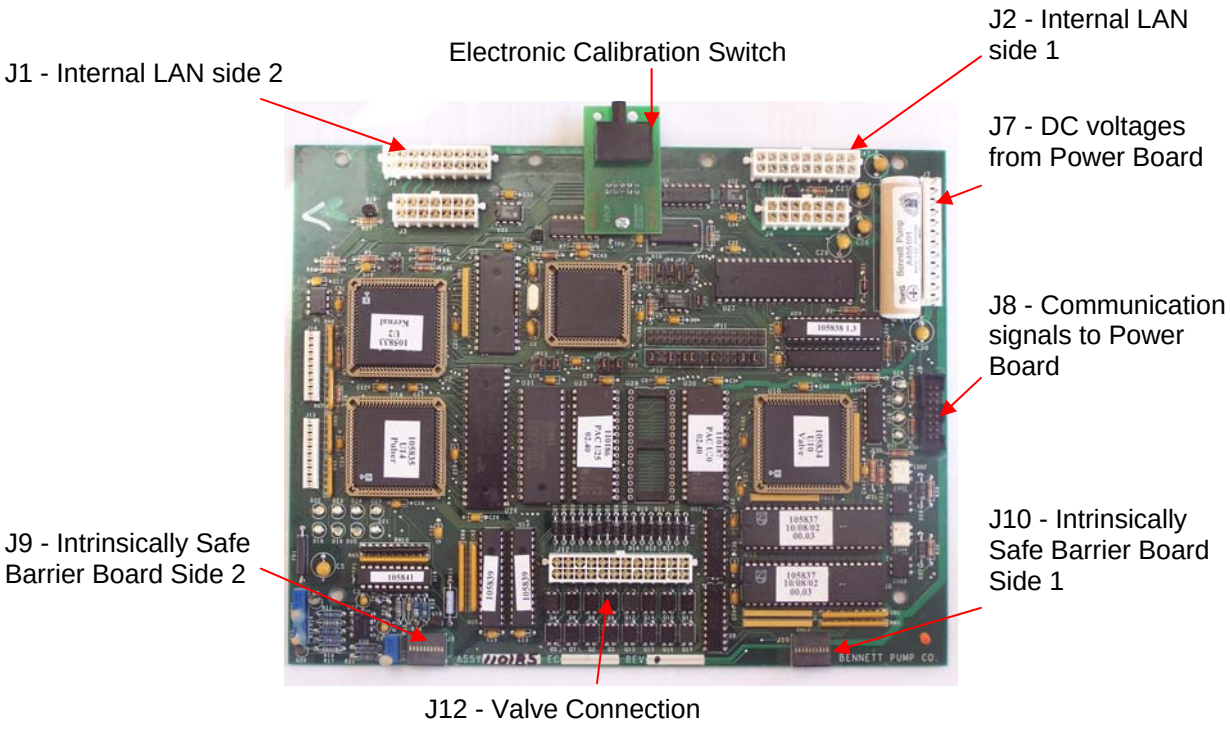
A) Default password back to 2218
B) Resets non reset-able electronic totals
C) Sets prices to zero

The following options are NOT affected by performing a RAM Clear:

- Gallon / Liter / Imperial Gallons
- Volume Resolution Flag
- Decimal Mode
- Number of Grades
- Pre-charge Time
- Number of Hoses
- Beeper
- Number of Tiers
- Fleet
- PPV Dash
- PPV Flash
- Cross Multiply Money
- Push to Start
- Console / Stand Alone
- Blender
- Truncate / Round Sale
- Mixer
- Allocation Limit
- No Flow Timeout
- Blend Ratio
- Blend Error Band
- Slow Flow Amount

CPU Board

Figure 18 - CPU Board


J1 - Internal LAN side 2
Electronic Calibration Switch
J2 - Internal LAN side 1
J7 - DC voltages from Power Board
J8 - Communication signals to Power Board
J9 - Intrinsically Safe Barrier Board Side 2
J10 - Intrinsically Safe Barrier Board Side 1
J12 - Valve Connection

J1,J2 - (Internal Local Area Network LAN) Product Select Keypad Connectors (18 Position AMP Mini-Universal Header) sides 1& 2. These multi-colored/conductor cables are the “Daisy Chain” that connect all other parts of the dispenser through the product select board.

Pin #	Signal	Direction	AWG & Color
Pin 1	24vdc	Out	18 Ga. Orange
Pin 2	24vdc	Out	18 Ga. Orange
Pin 3	12vdc	Out	18 Ga. Red
Pin 4	12vdc (standby-Battery)	Out	18 Ga. Yell
Pin 5	12vdc / Reset	Out	22 Ga. Blue
Pin 6	14vdc / Recall	In	22 Ga. Violet
Pin 7	0 volts / Safety Stop	In	22 Ga. Grey
Pin 8	Keypad RS 485 Data(-)	Bi-Directional	22 Ga. Black
Pin 9	Keypad RS 485 Data(+)	Bi-Directional	22 Ga. Red
Pin 10	VeriFone RS 485 Data(-)	Bi-Directional	22 Ga. Orange
Pin 11	VeriFone RS 485 Data (Common)	Bi-Directional	22 Ga. Brown
Pin 12	VeriFone RS 485 Data(+)	Bi-Directional	22 Ga. White
Pin 13	Display-LOAD	Out	
Pin 14	Display-DATA	Out	
Pin 15	Display-CLOCK	Out	
Pin 16	Ground	Out	18 Ga. Black
Pin 17	Ground	Out	18 Ga. Black
Pin 18	Ground	Out	18 Ga. Black

CPU Board

J3 , J4 - Not Used

J7 - DC Voltages from the Power Distribution Board .

Pin #	Signal	Direction	AWG & Color
Pin 1	24vdc	In	18 Ga. Orange
Pin 2	24vdc	In	18 Ga. Orange
Pin 3	12vdc (standby)	In	18 Ga. Yellow
Pin 4	12vdc (standby)	In	18 Ga. Yellow
Pin 5	12vdc	In	18 Ga. Red
Pin 6	12vdc	In	18 Ga. Red
Pin 7	Ground	In	18 Ga. Black
Pin 8	Ground	In	18 Ga. Black
Pin 9	Ground	In	18 Ga. Black
Pin 10	Ground	In	18 Ga. Black
Pin 11	5vdc	In	18 Ga. Violet
Pin 12	5vdc	In	18 Ga. Violet

J8 - Communication Ribbon Cable from Power Distribution Board.

Pin #	Signal	Direction	AWG & Color
Pin 1	/Suicide-Power Fail	Out	16 Conductor Ribbon Cable
Pin 2	VeriFone RS485 data (-)	Bi-Directional	.
Pin 3	/Recall-(Previous Sale)	Out	.
Pin 4	VeriFone RS485 (Common)	Bi-Directional	.
Pin 5	/Power Fail- From power fail circuit	In	.
Pin 6	VeriFone RS485data(+)	Bi-Directional	.
Pin 7	N/C		.
Pin 8	N/C		.
Pin 9	Motor A +12Vdc relay control	Out	.
Pin 10	Dispenser com side 2 (+)	Bi-Directional	.
Pin 11	Motor B +12Vdc relay control	Out	.
Pin 12	Dispenser com side 2 (-)	Bi-Directional	.
Pin 13	Motor C +12 Vdc relay control	Out	.
Pin 14	Dispenser com side 1 (+)	Bi-Directional	.
Pin 15	Motor D +12 Vdc relay control	Out	.
Pin 16	Dispenser com side 1 (-)	Bi-Directional	.

CPU Board

J9, J10 - Intrinsically safe Barrier Board connections J9 (side 2) and J10 (side 1) to the CPU. These boards mount directly on the CPU and there is no cabling. It is direct connect. 20 position edge plug.

Pin #	Signal	Direction	AWG & Color
Pin 1	Pump Handle (+)	In	Direct Connect
Pin 2	Ground	Out	.
Pin 3	Disconnect	In	.
Pin 4	Ground	Out	.
Pin 5	Pulsed “D” Lag	In	.
Pin 6	Ground	Out	.
Pin 7	Pulser “D” Lead	In	.
Pin 8	Ground	Out	.
Pin 9	Pulser “C” Lag	In	.
Pin 10	Pump Handle (-)	In	.
Pin 11	Pulser “C” Lead	In	.
Pin 12	+12vdc	Out	.
Pin 13	Pulser “B” Lag	In	.
Pin 14	+12vdc	Out	.
Pin 15	Pulser “B” Lead	In	.
Pin 16	+12vdc	Out	.
Pin 17	Pulser “A” Lag	In	.
Pin 18	+12vdc	Out	.
Pin 19	Pulser “A” Lead	In	.
Pin 20	+12vdc	Out	.

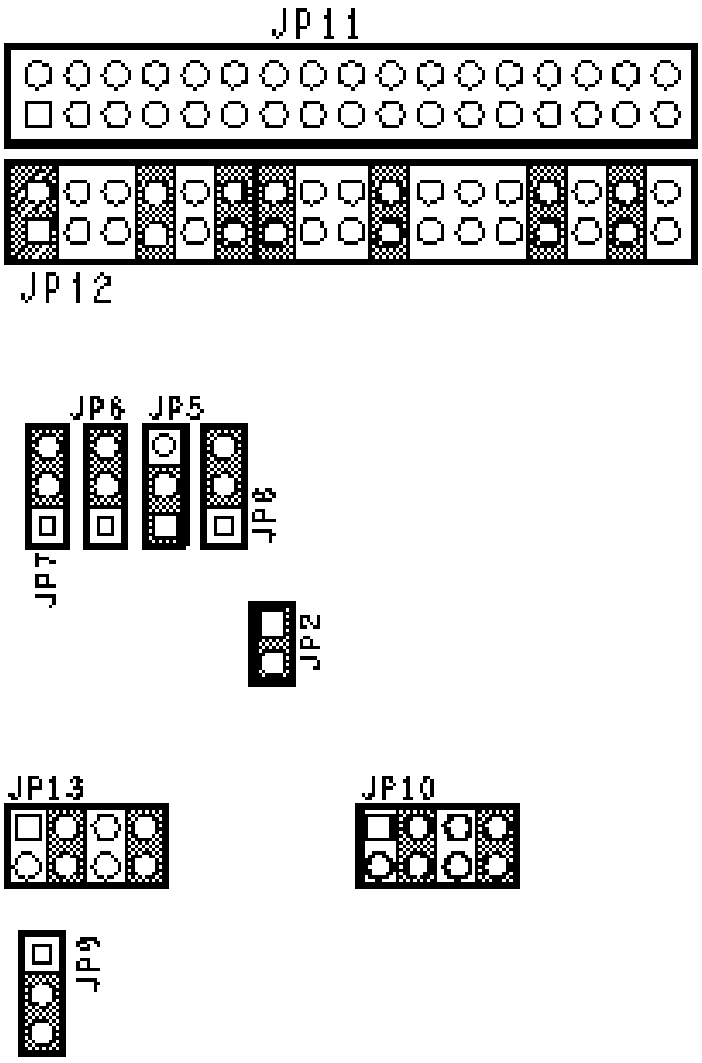
J1 - Memory Board - Not Used

J13, J14 - Loop Back - Not Used

CPU Board

CPU Board Jumper Settings -

The CPU board has a series of jumpers installed on the board. The proper jumper configurations are shown below.



Valve Control

Proportional Valve Control - The proportional valves are +24 volt valves. The way the proportional valves handle a preset or a prepay is to modulate the proportional valves for the two gas products to slowly close off the valve at the end of a sale. Also, these valves are only 2 wire.

The way the blending action works is that you have two valves. One on the output of the low grade product meter and one on the outlet of the high grade product meter. The CPU controls the flow through these valves by “modulating” (opening and closing) them with +24 volt dc pulses. The valves are modulated at a rate proportional to the blend ratio that is programmed into the dispenser programming mode 7 when the blending function is turned on. It is not enough that the CPU pulses the valves, but, it must receive feedback from the pulsers to make sure that the valves are opening to the right amount and, if not, the CPU can make adjustments. This is why, if you could monitor the output shaft of each meter you would see one meter spinning a little faster than the other and then the CPU makes and adjustment and the other meter starts spinning faster as the other slows down. The CPU checks the output every gallon. If there is an error due to too much of one product going into the mix, an error will appear and the sale will stop. You can program a “range” of “blender error” from 1 % to 100%. This setting, also in mode 7, allows you to set a point at which you can trip an error and shut down the dispenser.

The blend ratio can be set in mode 7 as previously mentioned. A Bennett pump does not blend octane, it blends volume. In other words, if you have a low grade with a certain octane rating and a high grade with a certain octane rating, then you must contact the company that supplies that fuel and ask them how much of the low grade should we blended with the high grade to reach a certain octane level. The maximum blend ratio you can set is 80/20. the first number always refers to the amount of the low grade that goes into the mix. Also, the blend ratio can only be set at the dispenser and not the POS. This is to prevent fraud.

These proportional valves are modulated to deliver the correct amount of the blended product based on the blend ratio programmed in mode 7.

If a straight grade is selected the other straight grade valve remains closed.

The proportional valve contains a plunger, a spring and a diaphragm. See figure 20.

Figure 20 - Components of a proportional valve

Valve Control

Outlet Manifold - The outlet manifold is just a housing for a series of check valves. You would normally have multiple steel tubes (product lines) connected to it. The check valves only allow product to flow one way. The mixer valve uses the same check valve that is used in the product inlet casting at the base of the pump.

There is also a functional element that will relieve back pressure below 50 p.s.i.

An example of the mixer valve is shown in figures 21, 22 and 23.

Service Tip! Leaking Check Valve in the Mixer - If one of these check valves is leaking, the product, which has already been counted, can leak thru to the other side and out the other sides nozzle if it is in use.

Figure 21 - Outlet Manifold is a housing for check valves.

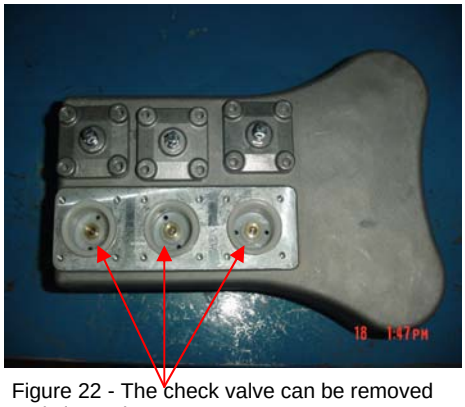


Figure 22 - The check valve can be removed and cleaned.

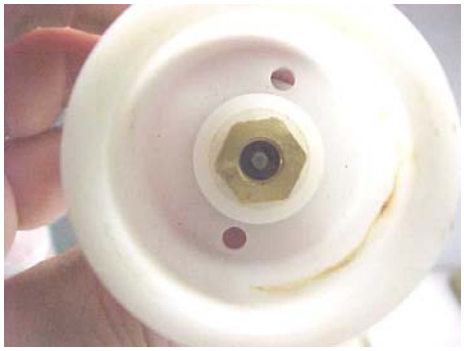
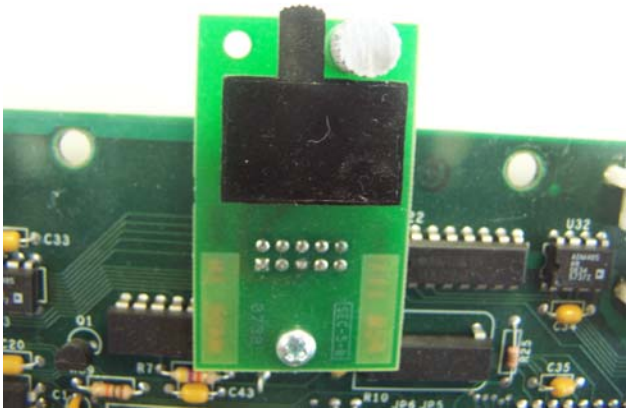


Figure 23 - Functional element (center) relieves pressure below 50 p.s.i.

Valve Control



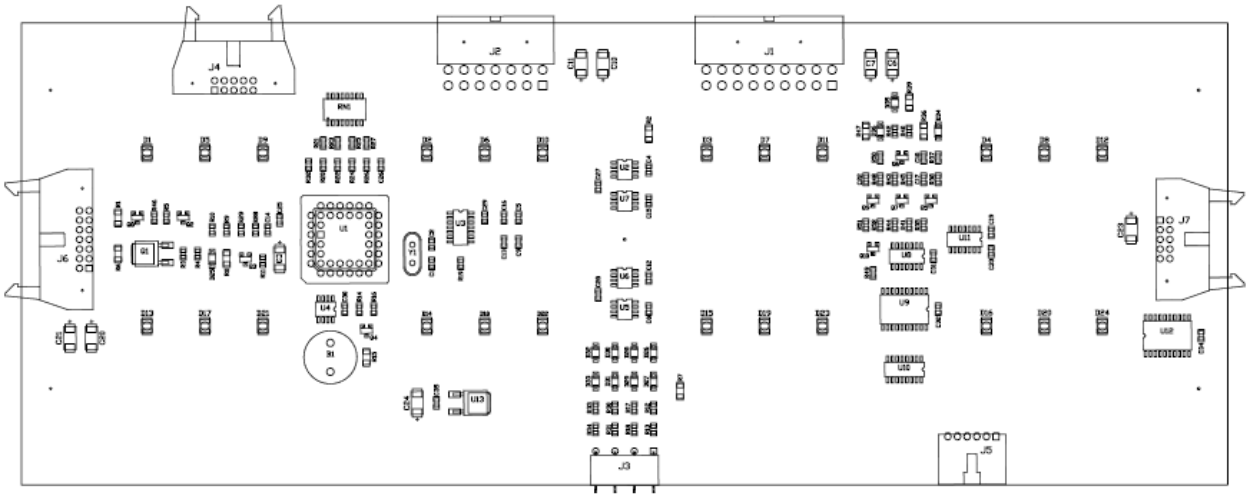
Electronic Calibration Switch Board Part Number - 111663
Board Functions:

- Enables / Disables Electronic Calibration functions of the dispenser.

The Electronic Calibration Board is soldered onto the CPU Board on the J11 connection. There is a stud provided to prevent anyone from moving the switch into the Calibration Mode. This stud must be sealed in to restrict tampering with the calibration settings. Mode 27 cannot be accessed with the switch in operate mode. If the customer attempts to fuel with the switch in the calibrate position then an error 74 will be displayed.

Notes

Product Select/Auxiliary Display Board



Product Select / Auxiliary Display Backlight Board - 107336

- Used by the customer to select the grade of fuel or as the dispenser start button.
- The Manager Keypad plugs into this board to program the dispenser.
- The Electromechanical Totalizers are plugged into this board.
- The Main Display Board is plugged into this board.
- The Auxiliary Display Board is plugged into this board.
- The Local Preset or Card Readers are routed through this board.
- The Auxiliary Display Board is illuminated by the LED's mounted on this board.

Theory of operation - The product select / auxiliary display backlight board controls the product select touch pads (J3). These pads are used for the Grade Selection or the Press to Start. These touch pads are similar in function to a standard dry contact normally open switch type keypad but it has a different operating principle. These work using electrical "capacitance". In other words, when the customer places their finger within proximity of a pad, the electrical capacitance of the pad circuit changes and the system recognizes this as a key press. There are no moving parts on this keypad so it doesn't suffer so much from wear and tear. The system can be programmed to give a "beep" when any key is pressed. The keys are not programmable.

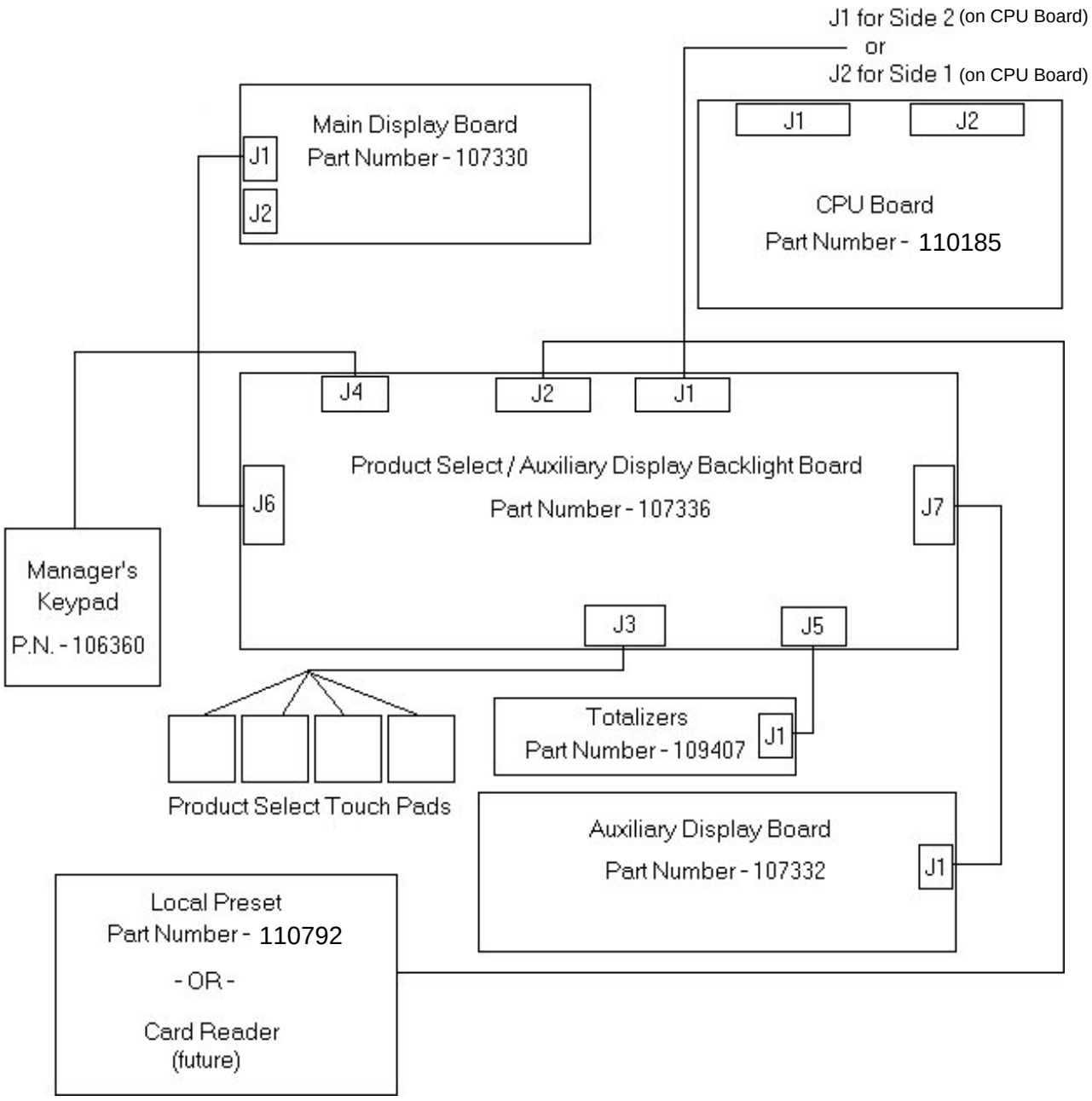
This board is also used to route data for the Main Display (J6) and to the Auxiliary (PPG) Display (J7).

The data for the electromechanical totalizers are also routed through this board (J5). The electromechanical totalizer is a mechanical counter that tracks meter totals mechanically and in a Non Re-settable grand total fashion.

There is one Product Select / Auxiliary Display Backlight Board per side, they are identical and interchangeable.

This board is where you plug the Manager's Keypad for programming the dispenser (J4).

Product Select/Auxiliary Display Board



Product Select/Auxiliary Display Board

How to Prepare the dispenser for Programming -
Programming of the dispenser is easy with the use of the Manager Keypad. One Managers keypad is shipped with each Pacific dispenser along with a ribbon cable. After use it is recommended that the managers keypad and cable be stored back inside the electronics head for the next person to be able to program if need be.

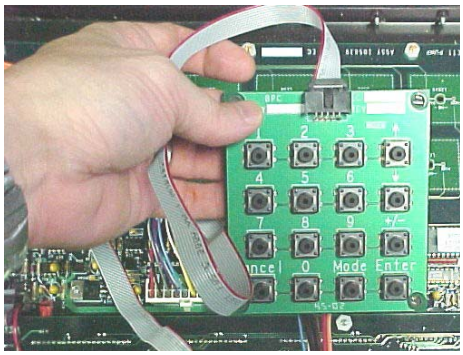


Figure 2 - Connect the Manager Keypad to the Product Select / Auxiliary Display Back-light Board connector J4.

All programming of the dispenser is done from side 1. Side 1 is identified as the side with the serial plate attached to the base plate.
Programming is done first for side one and then for side two.
Note– Most programming functions are 'copied" to side two after side one is programmed but not all. Always check side two after programming side one.

Locate the managers keypad and ribbon cable by removing it from the plastic bag that came in the electronics head. With all handles hung up in their nozzle boots and with the dispenser turned "on", and with side 1 upper door opened and lowered, connect the other end of the cable to the J4 connector on the Product Select / Auxiliary Display Backlight Board. The plug receptacle is marked as "Keyboard" and is located on the right hand side as you are looking at it.

Plug the managers keypad into the receptacle observing the proper plug polarity. You can unplug and plug in the keypad with the power on.

Manager's Keypad

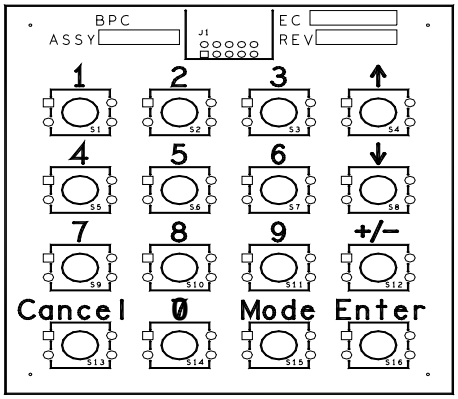


Figure 4 - Layout of the Managers Keypad

When the managers keypad is properly connected the dispenser will automatically enter into the Managers Mode and you should hear a "Beep" and see "Enter Side 1" on the display. Press the "Enter" key to program the dispenser. If the "Enter Side 1" message does not appear, disconnect and re-connect the cable.

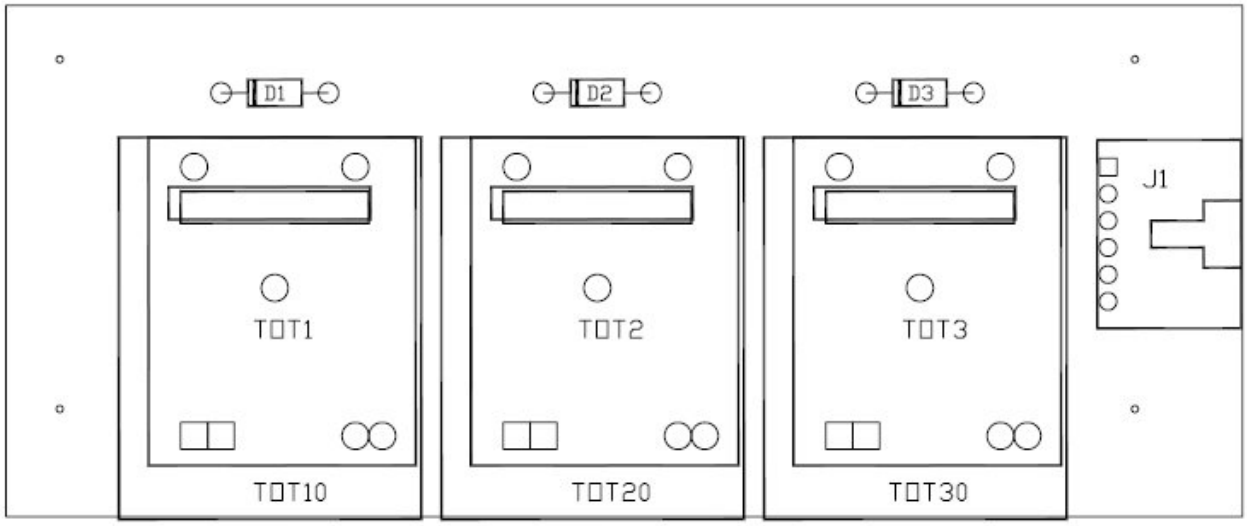
The dispenser will remain in the programming mode until the cable is disconnected. It will not "time out" . Replace the managers keypad back in the electronics head for safe keeping until the next time you have to program.

Programming can only be done from side 1.

A layout of the manager keypad is shown in Figure 4.

Refer to Pacific Operators Instructions for complete information on programming and diagnostic information.

Product Select/Auxiliary Display Board

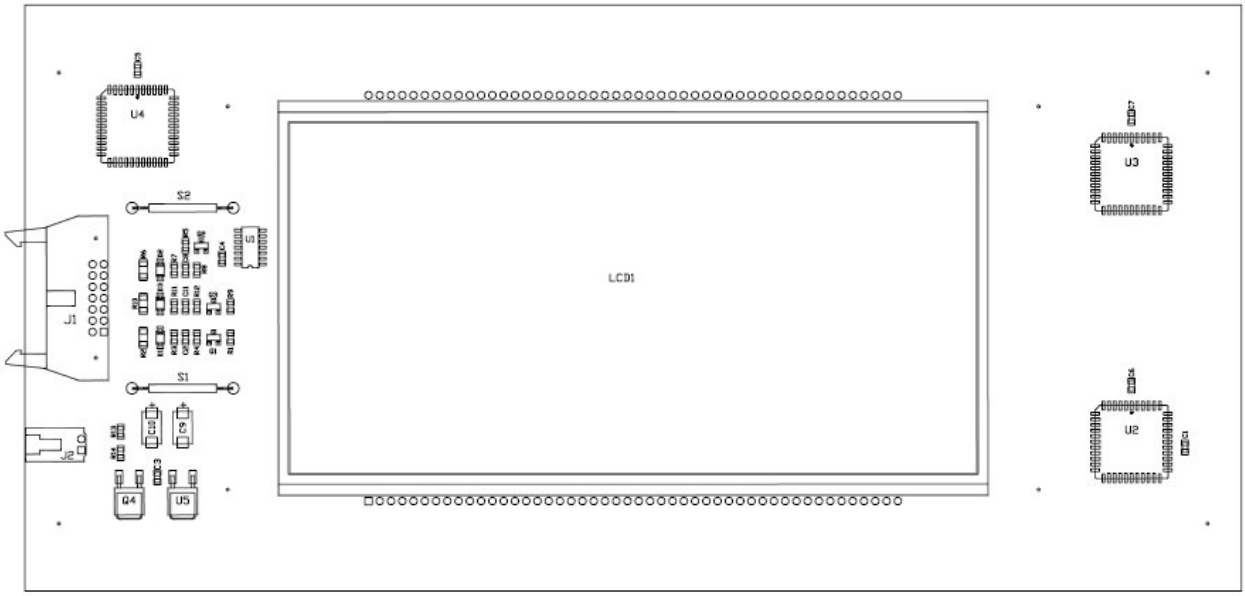


Totalizer Assembly – 109407

- These electromechanical totalizers are not field replaceable. If one totalizer fails you must replace the whole assembly.
- There is only one assembly for all Pacific dispensers. If this is a single or dual product dispenser then the extra totalizer(s) will not be used.
- The assembly has a J1 connector that is plugged into J5 of the Product Select / Auxiliary Backlight Display Board.

Notes

Display Board



Main Display Board - Part Number - 107330

- Displays Volume, Currency and Price information
- Displays information for diagnostics and sales totals
- Recalls the last Sale if there is a power outage
- Recalls the electronic totals
- Provides power for the Main Display Backlight Board

Theory of Operation - There is a customer display board on each side of the dispenser (if it's a 2 sided dispenser). This display is used for the customer to view sales information as well as certain prompting messages. This display gets its lighting from a backlight board. When the handle is lifted the display may have a prompting message that says "choose grade" or "push start". When the customer begins fueling, the pulser information is sent to the CPU board and there it is converted to display data and sent to the display. The display board just keeps up with the CPU in real time.

This board also holds the switches (S1 and S2) to recall the last sale if there is a power outage and to recall the electronic totals. These switches are a reed switch that's normally opened. As you hold a magnet (provided) over the switch then it will close and then the display will provide either the last sale (during power outages) or the electronic totals.

- S1 is used for the Electronic Totals. This switch is on the left side of the Main Display, in line with the volume amount of the sale.
- S2 is used to recall the last transaction during a power outage. This switch is on the left side of the Main Display, in line with the money amount of the sale.

To use this you simply hold the magnet up to the plastic overlay of the display around the vicinity of the switches. Locate the switches on our board drawing above.

Display Board

Description of Controls - There are no controls on this board.

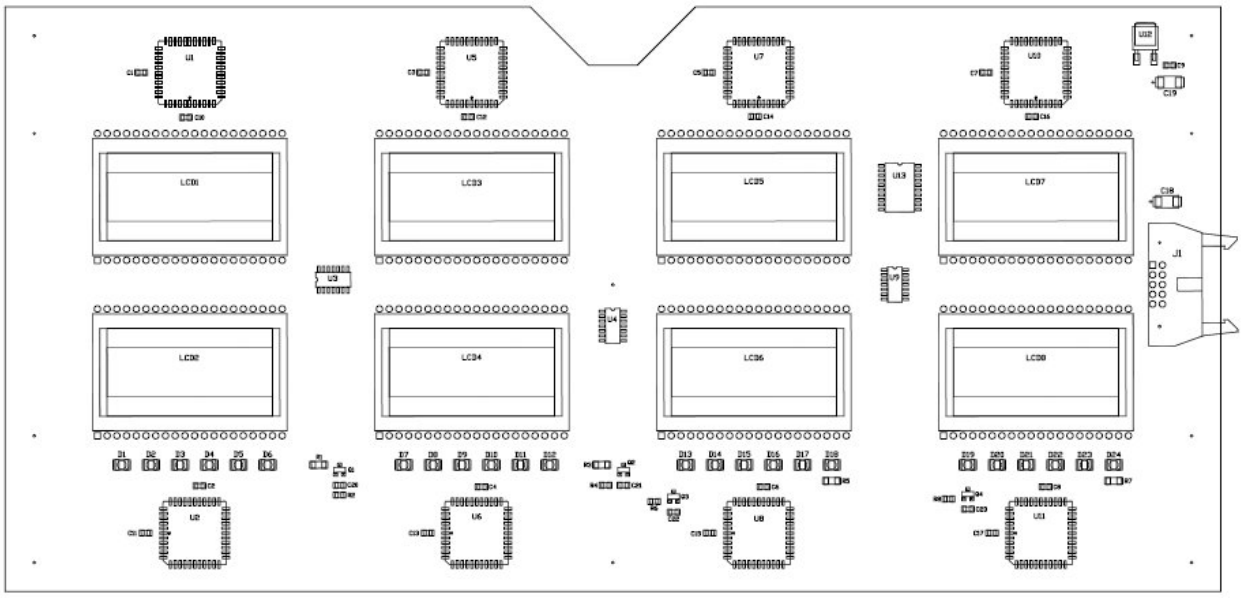
LED's - Other than the Liquid Crystal Display (LCD) there are no LED's. The LCD is not field replaceable.

Test Points - There are no test points on this board

Terminal Strips, Connectors and Pinouts - The following is a description of the connections to the terminal strips of all the connections on the main display board.

JP-1 Communication Ribbon Cable from Product Select / Auxiliary Backlight Board
JP-2 Power for the Main Display Backlight Board

The display board for each model Pacific is the same. Therefore, all you need to stock is one display board to service all the models.



Auxiliary Display Board - Part Number - 107332

- Controls up to four product prices
- Supports 2-Tier Pricing
- Provides LED's for the Grade Select Touch Pads

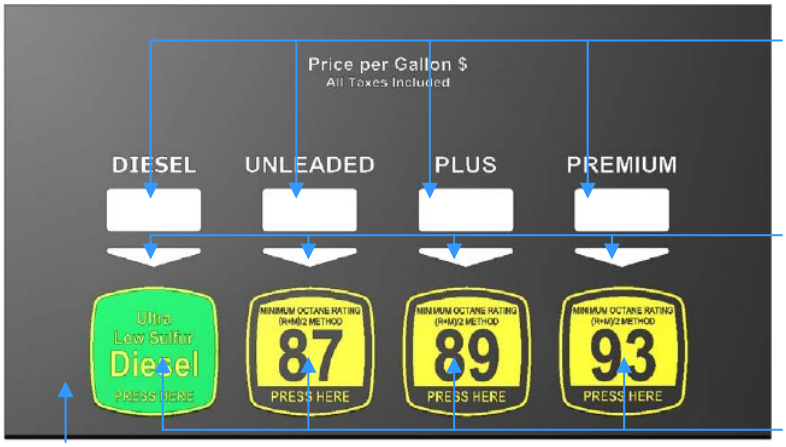
Display Board

Theory of Operation - There is an auxiliary display board on each side of the dispenser (if it's a 2 sided dispenser). This display is used for the customer to view pricing information. This display gets its lighting from a backlight board as well as provides lighting for the product select touch pads. As the customer selects the product the un-used product prices will either dash or blank out (depending on programming). You can also program the Price Per Volume to either flash while not in use or stay on continually.

This board can support up to four products. It's the same board on all dispensers so it is interchangeable.

The Pacific dispenser is able to control 2-Tier pricing. The Auxiliary Display Board will display both prices if programmed.

This board receives its data from J7 of the Product Select / Auxiliary Backlight Display Board via J1. There are no test points on this board.



PPV Displays

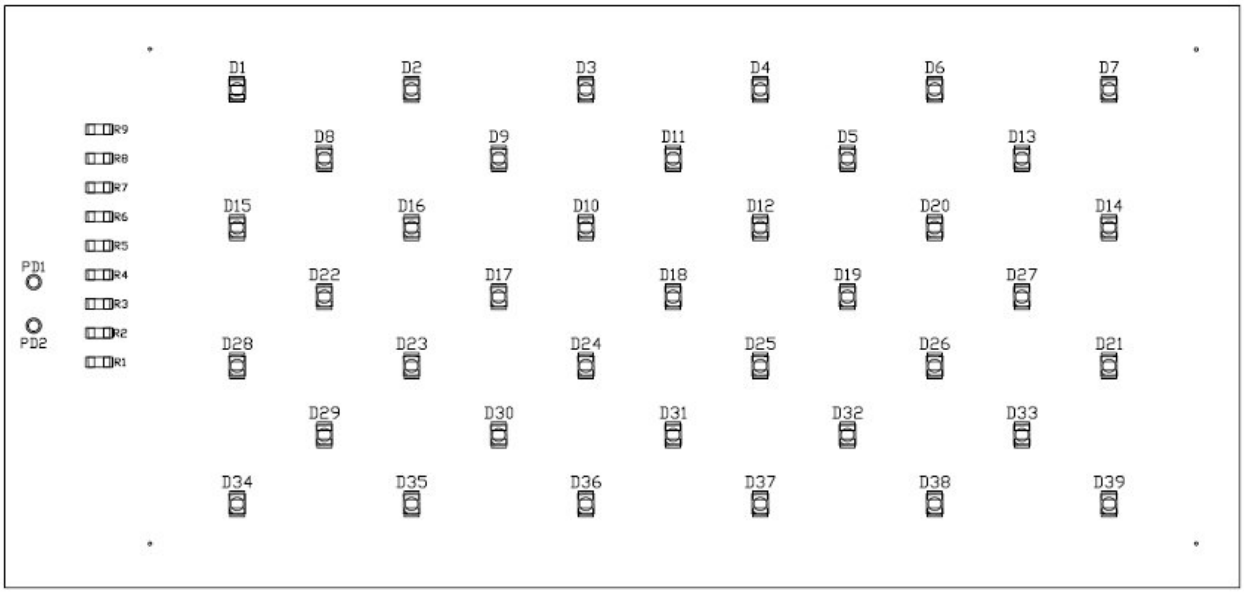
LEDs to help direct the customer where to select the desired product.

Product Select Touch Pads (Note that these are connected to the Product Select / Auxiliary Backlight Display)

If the dispenser only has 1, 2, or 3 products then the Overlay changes, not the Auxiliary Display Board.

Notes

Backlight Board



Main Display Back-Light Board Part Number - 107334

- Used to illuminate the Money / Volume Display.

Theory of Operation - There is a customer display board on each side of the dispenser (if it's a 2 sided dispenser). This display is used for the customer to view the sale information as well as certain prompting messages. This display gets its lighting from a backlight board. The backlight board is simply a board with numerous LED's mounted to it. This board has no "smart functions". It is simply a light source so that the customer can read the display information. The Backlight circuit is tied to the dispenser electronics and turns "on" whenever the dispenser has normal power.

The backlight gets it's main power from the display board through a small 2 wire connection. This is +24 Vdc. If the dispenser looses power or the main power drops below approximately 75 Volts AC then the Power Fail circuit takes over and the backlight board is turned off.

There is also a "diffuser" plastic piece mounted in between the display and the backlight board. A series of studs holds the boards in place.

Description of Controls - There are no controls on this board.

LED's - Numerous LED's are on this board but they serve no function other than as a light source.

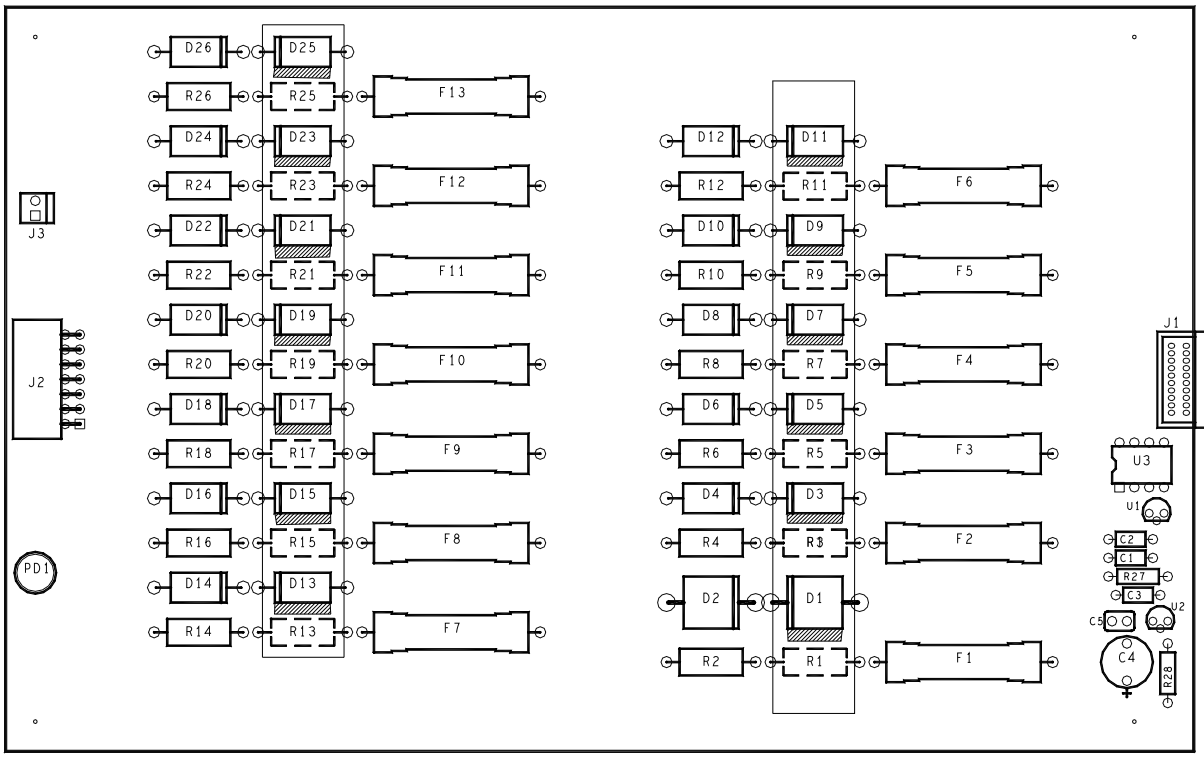
Test Points - There are no test points on this board.

Terminal Strips, Connectors and Pinouts - The following is a description of the connections to the terminal strips and pinouts of all the connections on the display board.

J1 - Power to the Backlight Board
PD 1 - +24Vdc
PD 2 - Ground

Notes

Intrinsically Safe Barrier Board



Intrinsically Safe Barrier (ISB) Board Assembly Part Number - 105660

- Provides an intrinsically safe barrier between the CPU and the Pump Handles and the Pulsers.
- Contains fuses and zener diodes that “Short” any high voltages and electrical current “away” from the handles and pulsers in the hydraulic area of the pump.
- Routes handle and pulser signals to the CPU board.
- There is one Barrier Module for side 1 and 1 for side 2. They are identical/interchangeable and have the same part numbers.

WARNING
The Intrinsically Safe Barrier module has special fuses that are soldered onto the board and **CANNOT BE REPLACED** in the field. If a barrier board has blown a fuse the board must be sent back to the factory for repair. If you try to field repair this board injury or death could result due to an explosion or fire at the pump.

The Pulser Barrier Boards need are covered by a metal cover. **Always replace the metal cover after servicing the equipment.**

Intrinsically Safe Barrier Board

Theory of Operation - The Intrinsically safe barrier modules provide ***intrinsic safety*** protection to the handle and pulser circuits located in the lower half of the dispenser in the hydraulic area. These circuits are designed with fuses and zener diodes to prevent any potential energy from entering the hydraulic area so that under no condition will there be enough energy to create an electrical spark hot enough to ignite gasoline vapors. There is one Intrinsically Safe Board (ISB) for side 1 and one for side 2. The boards are identical. The fuses on these boards cannot be replaced in the field as a UL requirement. These boards are covered with a metal cover to protect the circuits from an inadvertent short and the covers should always be in place when the dispenser is in operation. The ISB's do not have any discreet or "smart" components. There are two ISB's on a two sided dispenser, they are identical and are interchangeable.

The pulser information for each side of the dispenser is carried on a ribbon cable that daisy chains from one pulser to the next. This ribbon cable connects from connector J2 of the Barrier Circuit, runs through a potted conduit between the upper portion (electronics area - high voltage) section of the dispenser to the lower portion (hydraulics area - low voltage) section of the dispenser. Refer to the section on Pulsers to find out more about how the pulsers work.

The handle switch information for each side of the dispenser is carried on a 2 wire cable that connects from the J3 connector on the Barrier Circuit , runs through the same potted conduit between the upper portion (electronics area-high voltage) section of the dispenser to the lower portion (hydraulic area-low voltage) section of the dispenser, where it connects to the first handle switch. If there is more than one handle switch per side, a two wire cable is daisy chained to the next handle switch. Refer to the section on handle switches in this manual.

Description of Controls - There are no controls on this board.

LED's - There are no LED's on this board.

Test Points - There are no test points on this board.

Terminal Strips, Connectors and Pinouts - The following is a description of the connections to the terminal strips and pinouts of all the connections on the Barrier board.

J1 - This connector connects to J10 (side 1) on the bottom of the CPU to the Barrier Board. It is a direct connection (no cable).
This connection sends power and communication signals to the pulsers and handle switches.

Pin #	Signal	Direction	AWG & Color
Pin 1	Pump Handle (+)	Bi-Directional	Direct Connection
Pin 2	Gnd		
Pin 3	Interrupt	Out	
Pin 4	Gnd		
Pin 5	Pulser D Lag (phase 2)	Bi-Directional	
Pin 6	Gnd		
Pin 7	Pulser D Lead (phase 1)	Bi-Directional	
Pin 8	Gnd		
Pin 9	Pulser C Lag (phase 2)	Bi-Directional	
Pin 10	Gnd		
Pin 11	Pulser C Lead (phase 1	Bi-Directional	

Continued on next page...

Intrinsically Safe Barrier Board

J1 - (Continued)

Pin #	Signal	Direction	AWG & Color
Pin 12	+12 Vdc		.
Pin 13	Pulser B Lag (phase 2)	Bi-Directional	Direct Connection
Pin 14	+12 Vdc		.
Pin 15	Pulser B Lead (phase 1)	Bi-Directional	.
Pin 16	+12 Vdc		.
Pin 17	Pulser A Lag (phase 2)	Bi-Directional	.
Pin 18	+12 Vdc		.
Pin 19	Pulser A Lead (phase 1)	Bi-Directional	.
Pin 20	+12 Vdc		.

J2 - Pulser Ribbon Cable Connection

Pin #	Signal	Direction	AWG & Color
Pin 1	+5 Vdc	Out	Ribbon Cable
Pin 2	+5 Vdc	Out	.
Pin 3	Gnd		
Pin 4	Gnd		
Pin 5	Pulser A Lead (phase 1)	In	.
Pin 6	Pulser A Lag (phase 2)	In	.
Pin 7	Pulser B Lead (phase 1)	In	.
Pin 8	Pulser B Lag (phase 2)	In	.
Pin 9	Pulser C Lead (phase 1)	In	.
Pin 10	Pulser C Lag (phase 2)	In	.
Pin 11	Pulser D Lead (phase 1)	In	.
Pin 12	Pulser D Lag (phase 2)	In	.
Pin 13	Interrupt (+)	Out	.
Pin 14	Interrupt (-)	Out	.

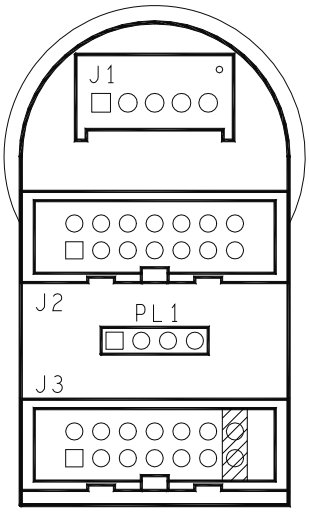
J3 - Pump Handle Connection - This is a two wire connection that communicates between the handles and the Barrier Board.
Each handle switch has an electronic PC board with a jumper that has to be set to identify which handle it is (i.e. A or B) Please see section on Handle switches. This cable connects to the Barrier Board on J3, runs through the same potted conduit as the pulser ribbon cable and then down to the first handle switch in the chain. Refer to the section on handle switches to find out how the cable connections work.

Pin #	Signal	Direction	AWG & Color
Pin 1	Pump Handle (+)	Bi– Directional	Red
Pin 2	Pump Handle (-)	Bi– Directional	Black

PD1 - Chassis ground connection. Must always be connected to insure the Intrinsically Safe Barrier Board is functioning correctly.

DANGER: A disconnected ground wire can allow uncontrolled amounts of energy to enter the hydraulic area creating a spark with sufficient energy to cause an explosion of the gasoline vapors.

Pulser Circuit



Pulser Board Assembly Part Number - 107927

- Pulser provides two separate channels or “phases” of “square wave” pulse information that represents the amount of fuel passing through the meter.
- One dual phase pulser is mounted to the top of each meter.

Theory of Operation - Dual Phase Pulsers - Pacific pulsers are dual phase electronics pulsers that pulse at a rate of 1024 pulses per gallon. The “Dual Phase” design is to prevent tampering. These pulsers are physically mounted to the output shaft of the meter. As fuel flows through the meter, the output shaft rotates and turns the pulser. Eight rotations of the meter represents one gallon of fuel.
The pulser is an optically coupled device with a spinning disk with two infrared beams and outputs 2 separate phases of square wave pulses 90 degrees out of phase with each other. We call these two phases phase 1 and phase 2 or “Leading” and “Lagging” phases. These signals are routed through a ribbon cable connection, in a daisy chain fashion where it connects through the vapor barrier to the barrier board for that side. There it connects to the CPU board for processing. The pulsers operate off a regulated +5volt dc signal that was created from a +12volt supply. When the valves are closed and there is no fuel flow, there should be no pulses output from the pulser. The pulser only generates pulses as it is turning. As it is turned by the output meter shaft it generates pulses, and sends these pulses to the CPU board through the ISB for that side. The CPU counts the pulses and performs the mathematical computations to covert this information to a display readout that shows the volume and it’s corresponding computed currency value on the main display. The CPU and the pulser works in conjunction with one and another. For example, the CPU first opens the blender valve for slow delivery. At this point the CPU is making sure that both phases are working. If one of the phases of the pulser is not working, the dispenser will never come out of the slow flow state. After 9 good pulses are received from both phases, the system energizes the blender valve and fast flow is achieved. Generally, a retail dispenser in fast flow puts out a maximum of 10-12 gallons per minute maximum due to state and federal regulations.

Error checking - The dual phase pulsers allow for error checking. One phase is used to check the other. For example, after pumping 1 gallon of fuel the CPU should see approximately 1024 pulses from each phase. There is a built in diagnostic where if the CPU sees more than 15 consecutive missing pulses from one or the other of the phases it will stop the sale and post an error message on the display of the side of the dispenser with the error. Also, on a blending dispenser, if one or the other product going into the mix is dispensing too slowly, an error will result. We know this because we read the pulse output which tells us how much fuel is being pumped from each product. Errors are stored in a diagnostic history file and any error that occurs can be cleared by removing and replacing the hose from the nozzle boot. Also, if the pulser is disconnected, an error will result.

Pulser Circuit

The pulser information for each side of the dispenser is carried on a ribbon cable that daisy chains from one pulser to the next. This ribbon cable connects from connector J2 of the Barrier Board, runs through a potted conduit between the upper portion (electronics area - high voltage) section of the dispenser to the lower portion (hydraulics area - low voltage) section of the dispenser. This ribbon cable connects to pulser connector J2 to the first pulser in the loop. Usually this is the “A” product. If there is more than one product (pulser) then another ribbon cable connects from the first pulser J3 (back) connector to the next pulser J2 (front) connector. And it works like this for the remaining pulsers except for the last pulser for that side in the loop. On the last pulser, a jumper must be placed across the last set of pins on J3 to identify that pulser as the last pulser in the loop. See figure on previous page.

J1 - Pulser Connection - Not Used

J2 - Connector - 14 Pin ribbon cable connection. This ribbon cable contains +5 Vdc power and communication signals for up to four dual phase pulsers.

Pin #	Signal	Direction	AWG & Color
Pin 1	5 Vdc	In	Ribbon Cable
Pin 2	5 Vdc	In	.
Pin 3	Gnd	In	.
Pin 4	Gnd	In	.
Pin 5	Pulser A phase 1	Bi-Directional	.
Pin 6	Pulser A phase 2	Bi-Directional	.
Pin 7	Pulser B phase 1	Bi-Directional	.
Pin 8	Pulser B phase 2	Bi-Directional	.
Pin 9	Pulser C phase 1	Bi-Directional	.
Pin 10	Pulser C phase 2	Bi-Directional	.
Pin 11	Pulser D phase 1	Bi-Directional	.
Pin 12	Pulser D phase 2	Bi-Directional	.
Pin 13	Connection Verification	Bi-Directional	.
Pin 14	Connection Verification	Bi-Directional	.

J3 - Connector - 14 Pin ribbon cable connection to the next pulser J2 connector.

Pin #	Signal	Direction	AWG & Color
Pin 1	5 Vdc	In	Ribbon Cable
Pin 2	5 Vdc	In	.
Pin 3	Gnd	In	.
Pin 4	Gnd	In	.
Pin 5	Pulser A phase 1	Bi-Directional	.
Pin 6	Pulser A phase 2	Bi-Directional	.
Pin 7	Pulser B phase 1	Bi-Directional	.
Pin 8	Pulser B phase 2	Bi-Directional	.
Pin 9	Pulser C phase 1	Bi-Directional	.
Pin 10	Pulser C phase 2	Bi-Directional	.
Pin 11	Not Used	Bi-Directional	.
Pin 12	Not Used	Bi-Directional	.
Pin 13	Connection Verification	Bi-Directional	.
Pin 14	Connection Verification	Bi-Directional	.

Pulser Circuit

Connecting Pulsers -
The pulsers connect to the Intrinsically safe Barrier Board through a ribbon cable in a daisy chain fashion. There are 2 Barrier boards, one for side 1 and one for side 2. All of the pulsers for side 1 connect to the barrier for side 1 and all of the pulsers for side 2 connect to the barrier for side 2.

Figure 1 - Ribbon cable for each side from electronics section.

The ribbon cable from the barrier board comes through the vapor barrier and connects to the first product pulser (usually "A" product) and then (if there is more than 1 pulser) another ribbon cable daisy chains to the next pulser. See Figures 1 and 2.

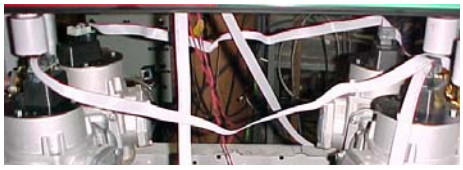


Figure 2 - Ribbon cable daisy chain

The ribbon cable has notches so that the cable cannot be put on backwards. If you look at figure 3 you will notice that there are 2 connectors on the pulser. The one in the center is the input connection from the barrier (if it's the first pulser) or the input from the previous pulser. This is connector J2. The rear connector in figure 3 (to the right) is the output connector to the next pulser or if it is the last pulser in the chain will have a jumper across the last row of pins. This connector is J3.

Caution - ***When connecting a pulser NEVER connect a pulser or disconnect a pulser without turning off the dispenser power and battery. Damage to the pulser or the Intrinsically Safe Barrier circuit will occur if power is left on.***

Test Points - There are no test points in the pulser circuit.

LED's - There are no LED's in the pulser circuit.

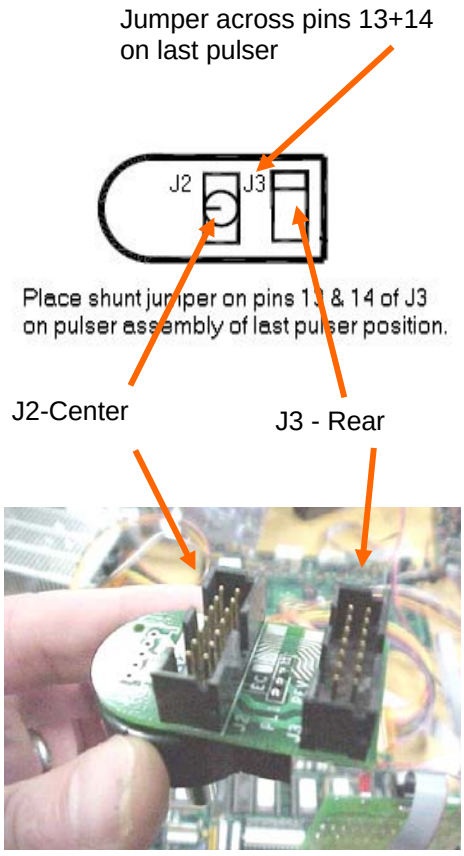


Figure 3 - Ribbon cable connection

Handle Switch Circuit

Magnetic Handle Switch Board uses wire and barrel connectors. Programming remains the same for either board type.

Magnetic Pump Handle Assembly Part Number - 111171

- Signals the CPU that a customer is requesting product at a fueling point when the nozzle is removed from the boot or the lift lever is raised.
- Signals the CPU to display the price for the chosen product

Theory of Operation - Handle Switches - Handle switches allow the system to know what product the customer wants to dispense and signals the CPU to turn on the proper pump motor. The handle switch uses a "reed" style proximity switch in conjunction with a magnet to signal when the nozzle has been removed from the boot or when the handle has been lifted (lift lever).

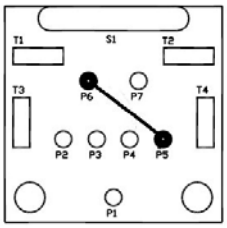
In the nozzle boot there is a spring loaded lever. Behind the lever is a magnetic pickup. When the nozzle is removed from the nozzle boot the spring loaded lever moves the magnet away from the proximity of a reed switch on the handle circuit board. When this happens, the reed switch is pulled open completing a circuit and sends an output voltage (somewhere between 2.330 and 3.000 Vdc) to the CPU. Each handle produces a specific voltage that allows the CPU to identify which handle is on (A or B) by using the jumper configuration shown on the next page. Then the CPU knows what product is being requested and sends the appropriate +12 volt dc signal to the appropriate relay to turn on the appropriate motor. It also causes the CPU to send the proper price display to the correct price window on the display board. When the handle is returned to the nozzle boot this signals that the sale is complete and the CPU sends this information to the Point of Sale device (if there is one) so that the sale may be collected. The valve should close immediately (less than 1/2 second) after the handle is hung up. The sale cannot be collected unless the handle switch is off. The same theory of operation applies if you have a lift lever instead of a flapper/nozzle boot.

There are LEDS on the CPU that can tell you if the handle switch has been lifted. There are also diagnostics for the handle switch. These topics will be covered later in this section and in Diagnostics.

Setting the barrel connections on the handle switch board - Each handle switch has an electronic pc board. This board has several electronic components including a wire and barrel plugs. You set the "address" of the handle by how you set this connections.
The barrel plugs should be set as follows:

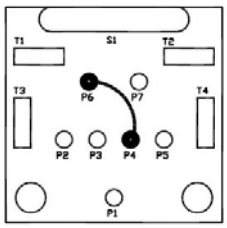
- Wire across P5 & P6 for product A (see figure 1)
- Wire across P4 & P6 for product B (see figure 2)

Figure 1



Example
Pump Handle A

Figure 2



Example
Pump Handle B

Continued on next page...

Handle Switch Circuit

General rule for setting connections on handle switch boards– From the side of the dispenser that you are standing on, the left most handle is always “A”, to the right of that one is “B”. The connection should be set up accordingly. **It doesn’t matter what side you are on**. If in doubt call Technical Support at 1-800-423-6638.

Handle Switch Location– The handle switch is located on the back of the Nozzle Boot near the bottom (see figure 3). If the dispenser has two nozzle boots on one side then the electronics are the same on both and so is the cabling.

When the nozzle is hung up the spring loaded lever moves towards magnet and closes the reed switch, signaling the CPU Board that the handle has been hung up. There is a magnet located in the lever (see figure 4).

With the nozzle removed the spring loaded lever moves the magnet (encased in the lever) away from the proximity of the reed switch on the pc board. This opens the switch and tells the CPU Board that the nozzle has been lifted.

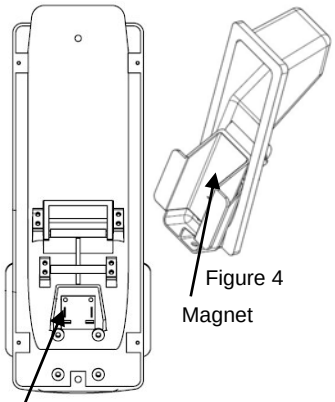


Figure 3
Magnetic Handle Switch Board

The Pump Handle -
(Lever Operation)
The pump handles are located on the front of the dispenser. To operate the dispenser, remove the nozzle from the holder and lift the pump handle up for the **ON** position. Push the pump handle down for the **OFF** position. These are referred to as “lift to start nozzle” boots.

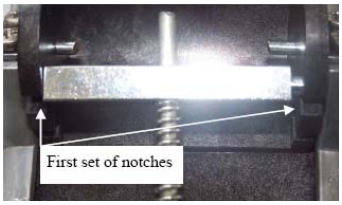


Figure 5

(Push to Start Operation)
The “Push to Start” nozzle boots turn on the dispenser as soon as the nozzle is removed from the nozzle boot (also referred to as Auto-On). With this style of operation the customer is required to select the desired product by pressing the appropriate product select switch. Note that the same Nozzle Boot can either be a Lever Operated or Push to Start Operated boot.

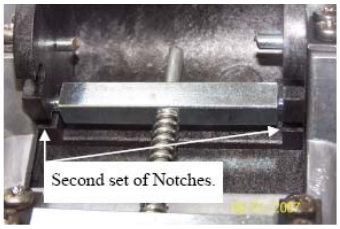


Figure 6

How to Adjust the Pump Handle for Lever Operation or Push to Start (Auto On) Operation.
Figure C shows the back side of a Nozzle Boot set up for the Lift to Start option. Notice that the cross bar is inserted in the first two notches on the black flapper. With this configuration the spring presses against the flapper at an angle that forces it to stay closed even with the nozzle removed.

To convert this into an Auto-On operation you will press down on the cross board and slide it into the second set of notches. See figure D. With this configuration the spring presses against the flapper at an angle that forces it open as you lift the nozzle.

Handle Switch Circuit

Test Points - You can measure for proper handle switch voltages on the CPU board on TP1 (side 1) and TP2 (side 2).

Warning! - Do not attempt to adjust these voltages in the field.

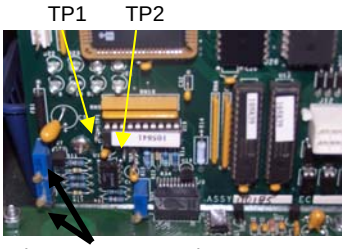


Figure 7 - Potentiometers RV1 and RV2 are sealed and must not be adjusted in the field.

Test Point TP1 - This is the voltage for the handle circuit side 1. Depending on what handle is lifted will be a different voltage for the handle detect circuit. The expected voltages for the different handles are as follows:

- Handles Off (side 1) - 3.00 volts dc
- Handle A - 2.790 volts dc
- Handle B - 2.730 volts dc
- Handle C - 2.620 volts dc - not used
- Handle D - 2.330 volts dc - not used

Test Point TP2 - This is the voltage for the handle circuit side 1. Depending on what handle is lifted will be a different voltage for the handle detect circuit. The expected voltages for the different handles are as follows:

- Handles Off (side 2) - 3.00 volts dc
- Handle A - 2.790 volts dc
- Handle B - 2.730 volts dc
- Handle C - 2.620 volts dc - not used
- Handle D - 2.330 volts dc - not used

Test Point TP3 - 3.000 volts dc

The blue potentiometers located on the lower left of the CPU board will be sealed from the factory. If these seals are broken the Warranty will be voided!

Handle Switch Circuit

Connecting the Handle Switches -
The handle switch cable is a black/red 2 wire cable that connects the barrier board for that side with the handle switch or handle switch "chain" for that side. It comes from the barrier board, passes through the same potted conduit as the ribbon cable for the pulsers (see figure 8) and connects to the first handle for that side.

Figure 8 - Handle and pulser cables from head to hydraulic area

If there is more than one handle per side you have to connect the handle switches in a "daisy chain" (see figure 9).

The red wires go to the T3 and T4 terminals and the black wires go to the T1 and T2 terminals. There are 4 terminals on this board marked T1-T4. If you look at the board with the "Reed" switch facing up, then the top left terminal is T1 and T3 is below that. The top right is T2 and below that is T4.

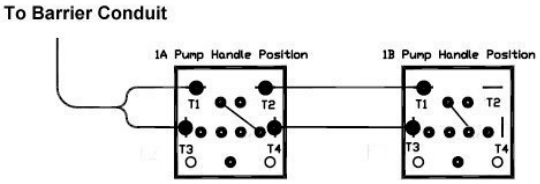


Figure 9 - Example of how two Pump Handle Switches are wired.

Red to (T3 or T4)
Black to Even numbered terminals (T1 or T2)

Example: A dispenser with 2 handles per side would connect in the following manner (see figure 10):

Step 1: The red/black 2 wire coming from the barrier in the head would go to the "A" handle first and the red would connect to T3 and the Black would connect to T1.

Step 2: The daisy chain cable to the next handle would go like this: Red wire from T4 on the first handle switch to T3 on the next handle switch and the black from the first handle switch terminal T2 to the next handle switch T1.

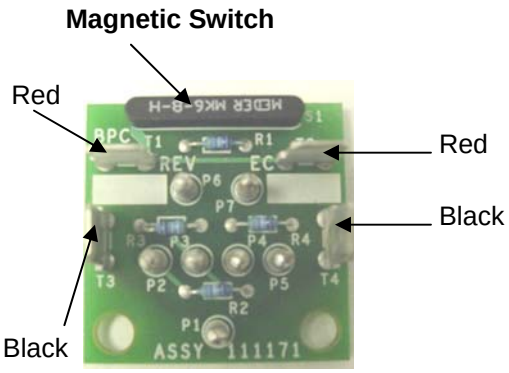


Figure 10 - Example of how to hook up handle switch wires.

Handle Switch Circuit

Light Emitting Diodes - The CPU board contains a series of LED's that indicate the status of the handle switches for side 1 and 2. They can be viewed on side 2 of the dispenser and are located on the lower left side of the CPU board. If the LED is ON the handle is hung up. If the light goes out the handle is on.

Example: Figure 11 shows All LED's illuminated. The top row are Handles A, B,C (not used) and D (not used) for side 2 from left to right and the bottom row shows side 1.

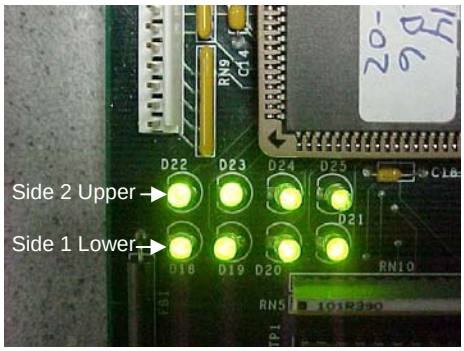


Figure 11 - All handles hung up for both sides

Figure 12 shows what would happen if side 2 handle "A" were lifted.

Handle Switch LED's -

LED D18 - Pump Handle side 1 product "A" - This LED is lit when the handle is hung up. Unlit when the handle is lifted .

LED D19 - Pump Handle side 1 product "B" - This LED is lit when the handle is hung up. Unlit when the handle is lifted

LED D20 - (not used) Pump Handle side 1 product "C" - This LED is lit when the handle is hung up. Unlit when the handle is lifted

LED D21 - (not used) Pump Handle side 1 product "D" - This LED is lit when the handle is hung up. Unlit when the handle is lifted

LED D22 - Pump Handle side 2 product "A" - This LED is lit when the handle is hung up. Unlit when the handle is lifted

LED D23 - Pump Handle side 2 product "B" - This LED is lit when the handle is hung up. Unlit when the handle is lifted

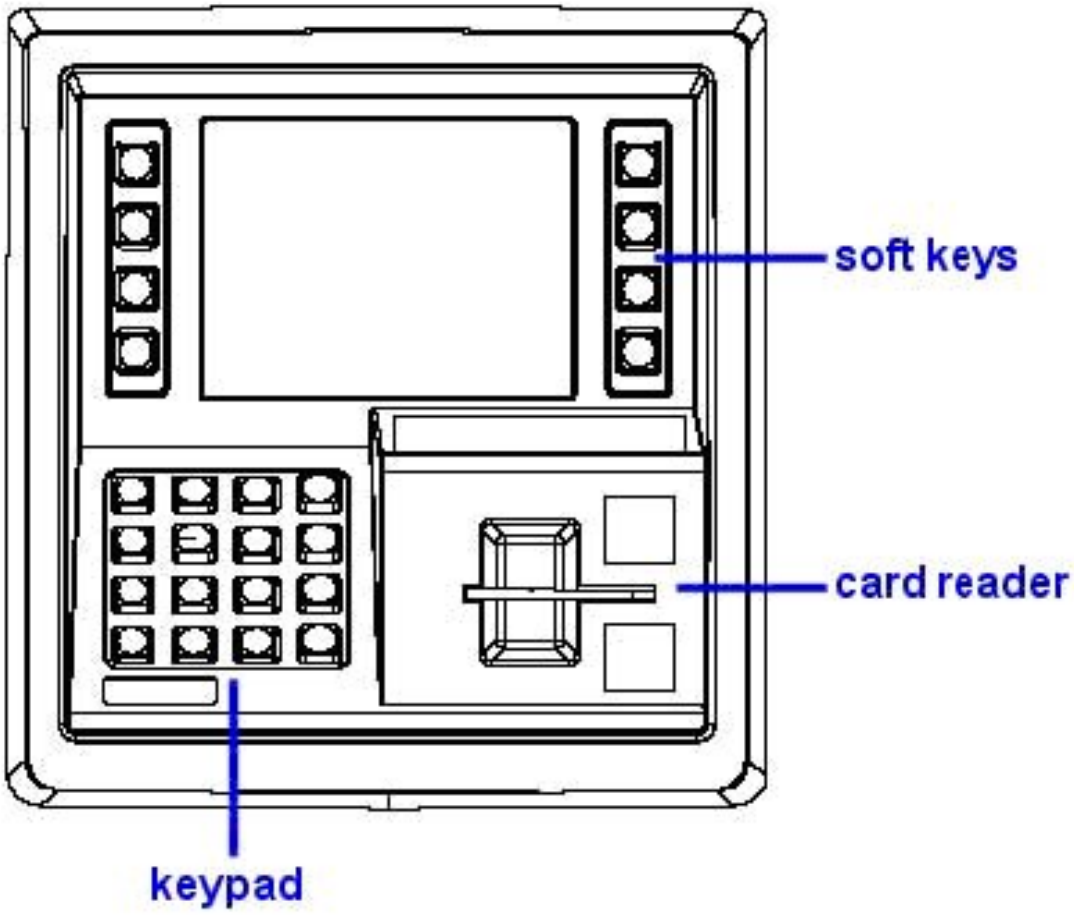
LED D24 - (not used) Pump Handle side 2 product "C" - This LED is lit when the handle is hung up. Unlit when the handle is lifted

LED D25 - (not used) Pump Handle side 2 product "D" - This LED is lit when the handle is hung up. Unlit when the handle is lifted .

Figure 12 - Side 2 handle "A" removed.

Notes

Secure PumpPAY (Card Reader)



Secure PumpPAY Card Reader Assembly

IMPORTANT NOTICE - It is extremely important **NOT** to install any Secure PumpPAY Terminals positioned in a way that may be viewed, copied, or recorded by any devices, such as a Security Camera, installed at the location.

- This section is intended for the technicians installing and/or maintaining Secure PumpPAY units in the Pacific Dispenser.
- This section describes how to integrate an Secure PumpPAY unit, which is an EMV-approved Chip & PIN processing unit, into a Pacific Dispenser.
- The Secure PumpPAY unit offers Soft Keys, Keypad, Card Reader, COM Ports, LAN Communication Port, and Battery (the battery supplies power to the unit's tamper-proof circuit).

SERIAL NUMBER :
Each Secure PumpPAY unit is supplied with a Serial Number. This serial number is on the rear of the unit. The Serial Number contains :

1. The unique serial number of the unit.
2. The number of the production batch to which the unit belongs.
3. A revision number.
4. A latest replacement date for the unit's battery.

Secure PumpPAY (Card Reader)

Like the Dispenser, the Debit/Credit Terminal has a Diagnostic Mode to verify where a problem may exist. The following instructions explain how to get to the Card Reader's Diagnostic Mode and how to perform each test.

- You will find that there is little repair work that is required on these units. Under normal circumstances you can fix problems before they happen with preventive maintenance.
- The two most important ways to keep up with the preventive maintenance on these units are to keep the keys clean and by cleaning the card reader periodically.
- The unit has three different types of diagnostics that you can use in the field: Keypad, Card Reader, and Printer.

Understanding the keys on the Secure PumpPAY Unit:

To maneuver through the Diagnostics you will use four buttons most of the time (see figure 1):

- "Top Right Soft Key" - This button is referring to the top right button along the right side of the Display. This button will be used to move right while maneuvering through the modes.
- "Top Left Soft Key" - This button is referring to the top left button along the left side of the Display. This button will be used to move left while maneuvering through the modes.
- "[#]" - This button is the button below the number [9] button on the numeric keypad. This button will be used as the "ACCEPT" button.
- "[*]" - This button is below the [7] button on the numeric keypad. This button will be used to backup in maneuvering through the modes.

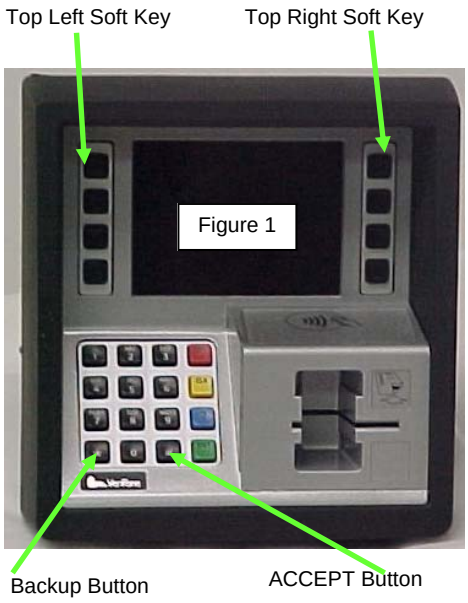


Figure 1

How to get into Diagnostics:

1. At the main welcome screen, press the [#] key and [1] almost simultaneously, pressing the [#] key first and then quickly pressing the [1] key (see figure 2).

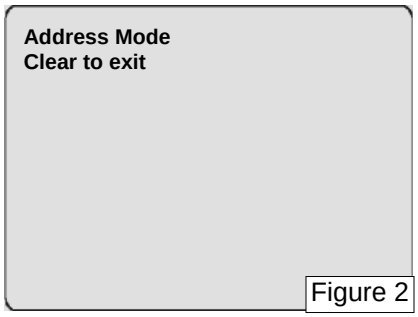


Figure 2

2. Press the [#] key and [1] almost simultaneously again. If a password has been set, the following screen is displayed. Note that this screen does not display the first time you enter Manager's Mode (see figure 3).

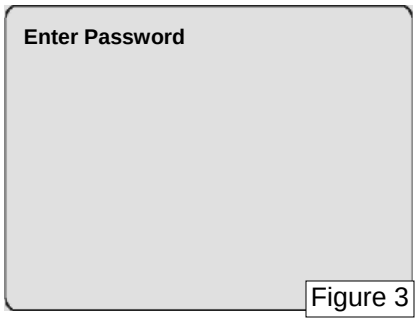


Figure 3

Continued on next page...

3. Enter the password and press [ENTER]. The screen displays the current settings (see figure 4).

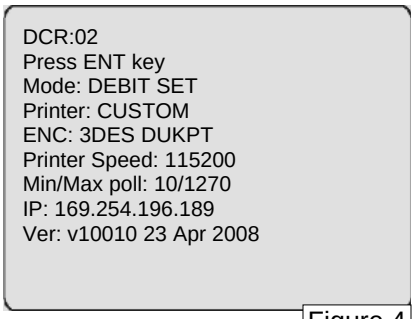


Figure 4

4. From the Settings screen, press the [ENTER] key again to display the Function screen (see figure 5).

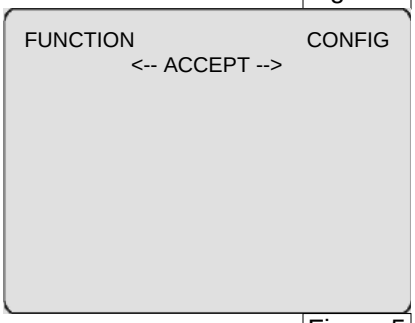


Figure 5

5. Use the top right soft key to display the diagnostics option (see figure 6).

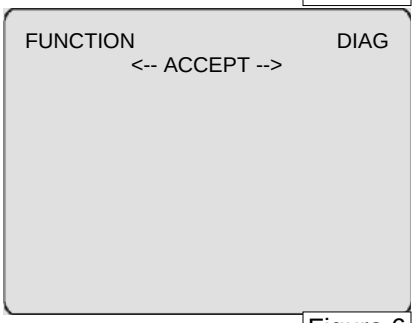


Figure 6

6. Press [ENTER] to display the diagnostics menu, and use the top right soft key to display MENU1 (see figure 7).

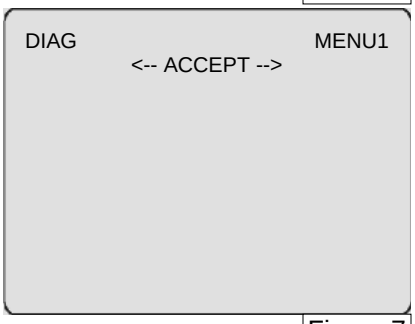


Figure 7

7. Press [ENTER] to display the diagnostics tests you can run (see figure 8).

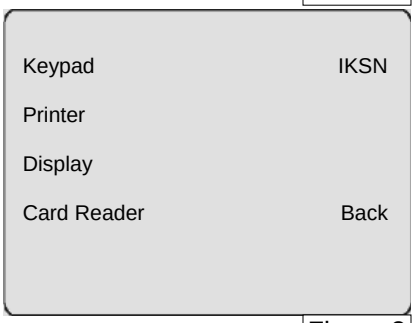


Figure 8

How to perform a Keypad Diagnostics Test:

Select the soft key next to Keypad to run the keypad test. As you press keys on the keypad, the screen changes to reflect the key presses. Check to make sure the key you press is correctly displayed on the screen. Press [CANCEL] to return to the screen with the test list (see figure 9).

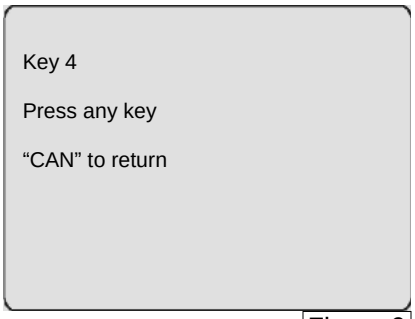


Figure 9

How to perform a Printer Diagnostics Test:

Select the soft key next to Printer to run the printer test. You will see figure 10 and then figure 11. After the printer prints a receipt remove it from the printer (see figure 12). If you do not remove the receipt and try the printer test again, you will get an error message (see figure 13).

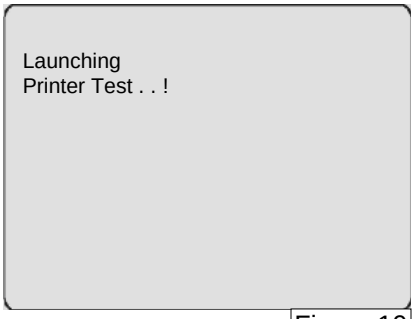


Figure 10

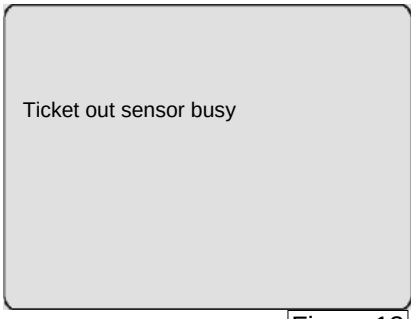


Figure 13

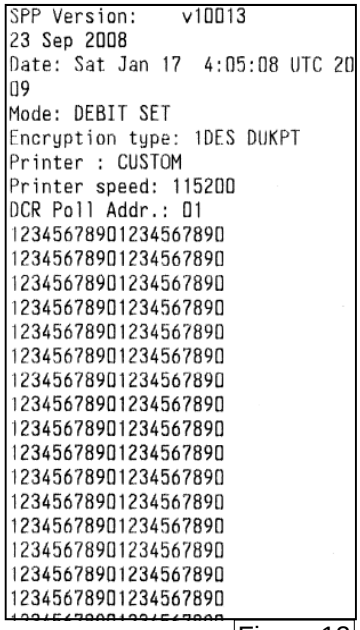


Figure 12

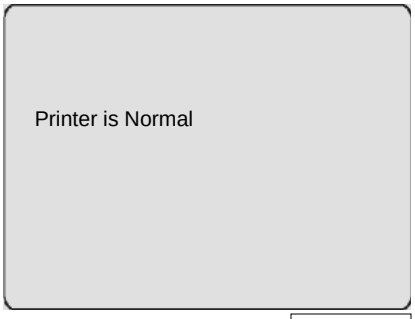


Figure 11

How to perform a Display Diagnostics Test:

Select the soft key next to Display to run the display test (see figure 14).

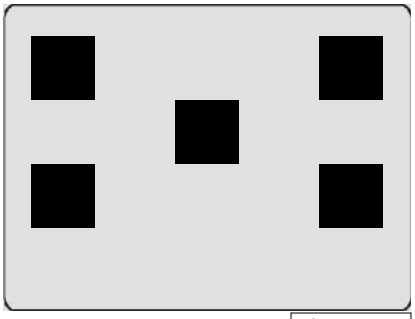


Figure 14

How to perform a Card Reader Diagnostics Test:

1. Select the soft key next to Card Reader to run the card reader test (see figure 15).

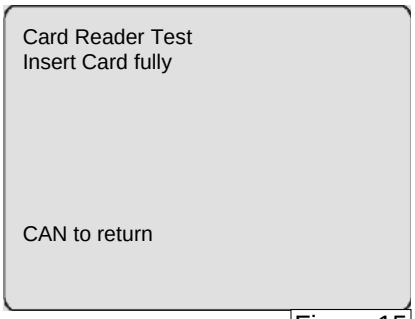


Figure 15

2. Insert a card (see figure 16).

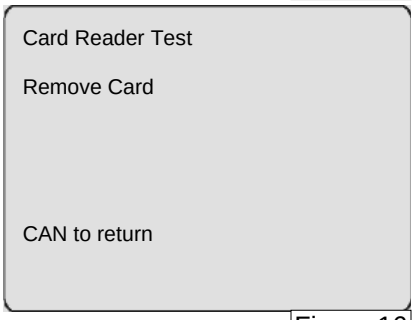


Figure 16

3. Remove the card. The screen displays information about the card (see figure 17).

4. To return to the test menu, press [CANCEL].

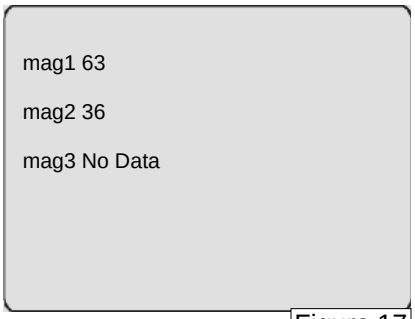


Figure 17

How to perform a DUKPT Encryption Diagnostics Test:

Select the soft key next to IKSN (see figure 18).

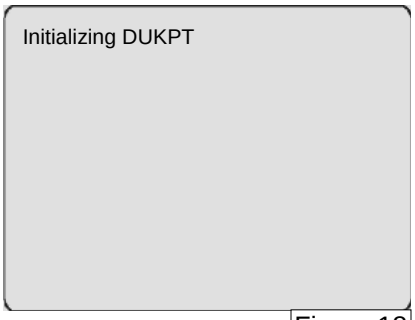


Figure 18

- If the test is successful, a screen similar to the following is displayed (see figure 19):

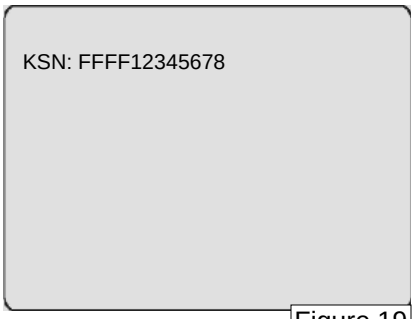


Figure 19

- If the test fails, the following screen is displayed (see figure 20):

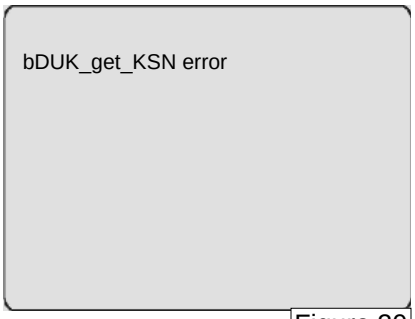


Figure 20

When you are finished with the diagnostics MENU1, press the Back soft key (see figure 8 - page H-3).

How to advance to MENU2 Option:

Use the top right soft key to display the MENU2 option (see figure 21).

Figure 21

How to perform a Pin Diagnostics Test:

This test is used to allow you to ping the back office from the Secure PumpPAY.

1. Press [ENTER] to display the list of MENU2 tests (see figure 22). Ping is currently the only option.

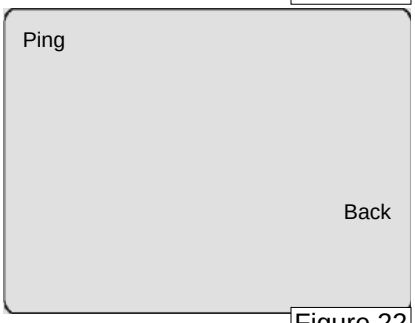


Figure 22

2. Press the menu key next to Ping to enter the IP address you want to ping (see figure 23). Press Back to return to the previous menu.

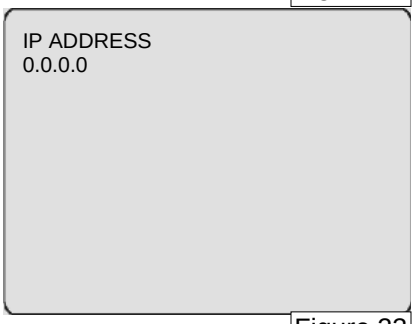


Figure 23

3. Use the keypad and the [*] and [#] keys to enter the IP address. Press [*] to move the cursor to the left; press [#] to move it to the left (see figure 24).

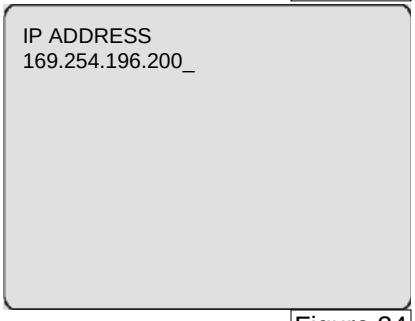


Figure 24

4. Use the keypad and the [*] and [#] keys to enter the IP address. Press [*] to move the cursor to the left; press [#] to move it to the left (see figure 24).

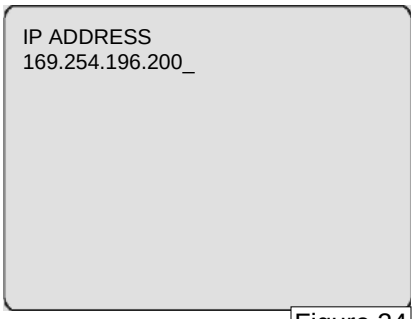


Figure 24

- If the ping is successful, the screen displays a message similar to figure 25.

Press any key to return to the Ping menu.

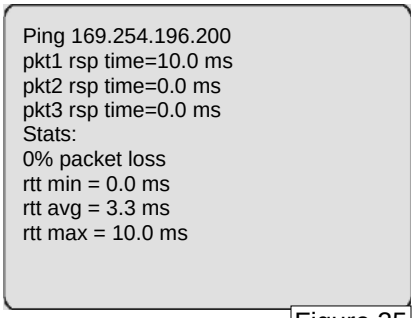


Figure 25

- If the ping is unsuccessful, the screen briefly displays the following error message and returns to the Ping menu (see figure 26).

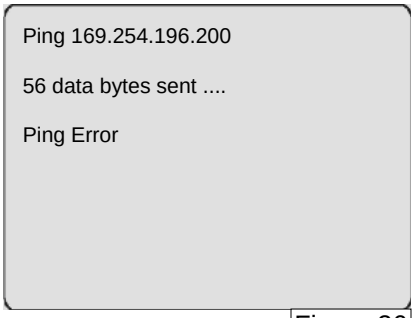


Figure 26

5. Press the Back soft key to return to the Diagnostics menu (see figure 21 - page H-6).

How to Exit Diagnostics:

1. Press [*] to leave the Diagnostics Function.
2. Press [*] twice to exit the Configuration Function and finish loading the SECURE PUMPPAY software.

Error Codes

Error Number	Error Description	Action
22	Service Switch Alarm	Enter a password… [TBD]
82	Mesh Break	Send unit back to VeriFone using the RMA process.
83	Mesh and Case Switch Break?	Send unit back to VeriFone using the RMA process.
Any other error number		Send unit back to VeriFone using the RMA process.

Secure PumpPAY (Card Reader)
Preventative Maintenance Tips

Card Reader:
Over time, oil, oxides, or other contaminants can accumulate on the card reader. Use a suitable cleaning card in the card reader.

Keypad and/or Front:
To ensure proper hygiene for customers and to ensure the correct functioning of the SECURE PUMPPAY unit, keypad and front section of the unit must be inspected regularly because grease or other contaminants can accumulate from customer use of the unit. To clean a unit's keypad/front section, complete the following steps:

1. Use a dry clean cloth to remove any dust.

2. Use a cloth and soapy water to remove any grease or other stubborn stains.

NOTE: Do NOT direct a power hose at a unit.
NOTE: Do NOT use any solvents or cleaning agents to clean a unit.

Battery:
A unit's battery powers its anti-tamper circuitry when main power is not present. Each battery should have a working life of at least 5 years. (A unit's battery replacement date is printed on a label on the rear side of the unit.) Ordinarily, a unit's battery should be replaced during each scheduled service of the unit or during any corrective repair of the unit. The battery is mounted in the card reader housing.
To replace a battery:
1. Open the cover on the card reader housing.
2. Find the two extension cables: one is connected to the existing battery, the other is a spare extension cable.
3. Connect the new battery to the spare extension cable.
4. Detach the old battery from its extension cable.
5. Remove the old battery. Dispose of the battery at a suitable disposal site.
6. Put the new battery into the space that used to be occupied by the old battery.
7. Tuck both extension cables into the housing.
8. Close the cover on the card reader housing.
9. Update/replace the label that states the battery's replacement date.

Adjusting the LCD Display Contrast

The LCD display unit's screen contrast is set during manufacture. Ordinarily, it should not require adjustment. To adjust the LCD display unit's screen contrast:

1. On the rear side of the unit, break the seal under the COM2 port.
2. Use a Phillips screwdriver to adjust the screen contrast as required.

Secure PumpPAY (Card Reader)
Troubleshooting

Symptom	Possible Cause/Resolution
The POS Controller does not see ANY Secure PumpPAY units – DCR Polling Errors.	Check cable on the back of the POS Controller, com 9 should be securely seated.
	Check the I/O Configuration on the POS Controller, to ensure the correct Edits in GemStall were selected for the Secure PumpPAY.
	Check the B & B Connector. Ensure the switch is set for Wayne.
	Check to ensure there is power at the Dispenser and that each Secure PumpPAY is lit.
	Check to ensure there are no error messages appearing on the Secure PumpPAY devices.
The Secure PumpPAY will work with credit cards but not with debit.	Check the Secure PumpPAY configuration to ensure Debit was selected.
	Check the POS Controller, to ensure the correct parameters were set up for Debit and Dukpt.
	Run the Debit Encryption test in diagnostics mode on the Secure PumpPAY.
The Secure PumpPAY displays “loading” messages containing a lot of strange characters.	This is caused by a DCR assignment error. The DCR assignment has been duplicated. You will need to determine which DCR assignment was duplicated, correctly configure on the units and then reboot both units.
The Secure PumpPAY displays “please pay inside (E01)”.	The DCR / Secure PumpPAY is not loading properly. Check the following:
	Com 9 on the POS Controller is securely seated for DCRs.
	If it is more than one DCR, reboot the POS Controller.
	Check the DCR parameters to ensure the unit(s) were set up correctly.
	Check the Power Distribution Board communication wiring for TS3. The wires must be in the correct terminals and securely fastened.
	Go into the DCR parameters, change a parameter on one of the Secure PumpPAY units that is displaying the E01 error, save the change, then go back into the parameter, change it back to the correct setting, save the change, then Initialize that DCR to see if it corrected the issue.
	Change out the VIB2 and/or the Secure PumpPAY unit.

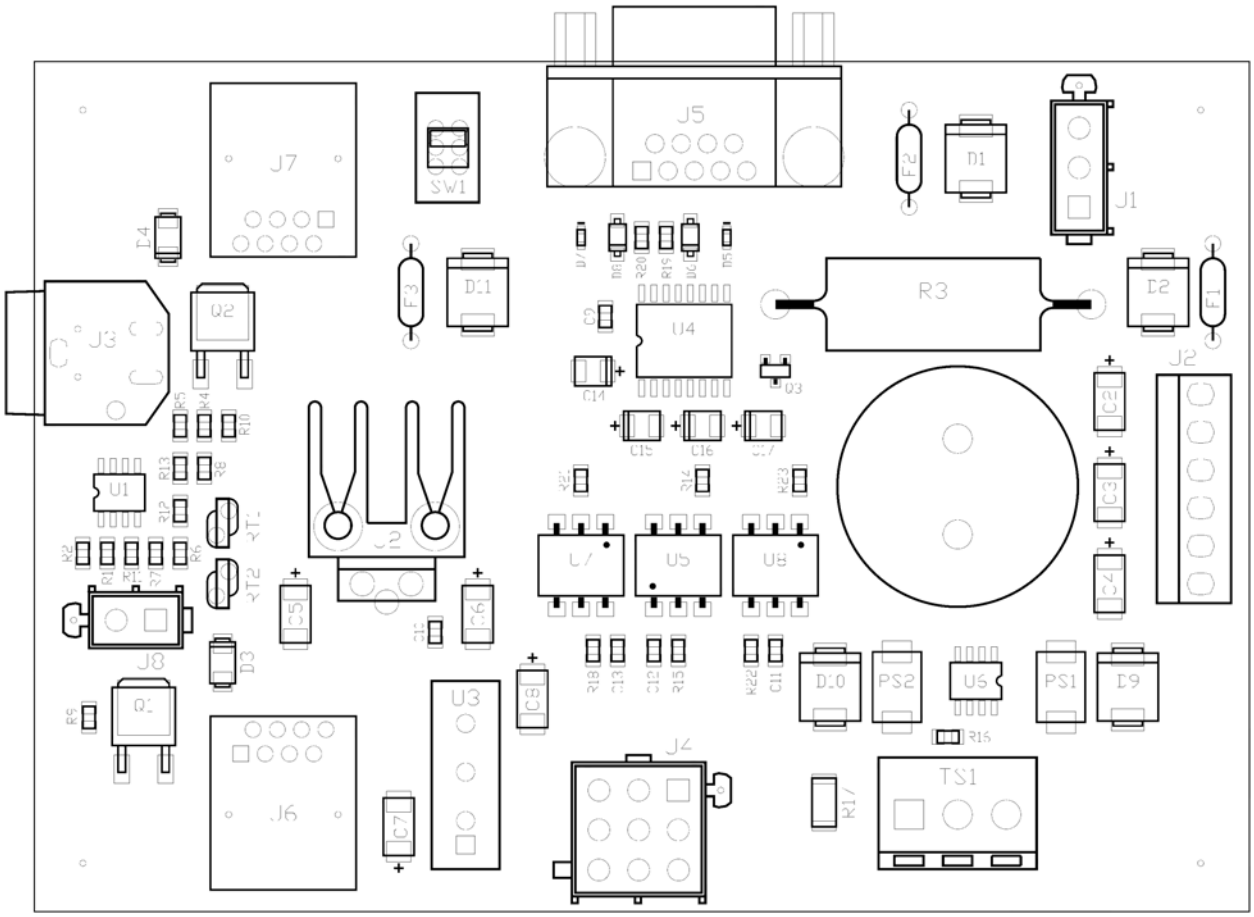
Secure PumpPAY (Card Reader)
Troubleshooting

Symptom	Possible Cause/Resolution
The Secure PumpPAY reboots intermittently.	More than likely it is a power issue – check the VIB2.
	After replacing the VIB2 and if the problem still persists it may be the Secure PumpPAY. Replace the VIB2 first to see if the problem is corrected.
	Check and make sure that there is less than 1 ohm resistance between Neutral and Earth Ground for the dispenser's power source.
When testing credit and debit cards the Secure PumpPAY does not respond to the first press of the CREDIT or DEBIT key. The unit flashes and simply redraws the screen.	May respond like this when the key is pressed a second time.
	Ensure there are no Poll Errors on the POS.
	Re-configure the Secure PumpPAY including the debit key and then try again. Secure PumpPAY may need to be replaced.
When testing cards the printer prints "Try Again" repeatedly.	This is caused by a DCR assignment error. The DCR assignment has been duplicated. You will need to determine which DCR assignment was duplicated, correctly configure both units and then reboot.
Secure PumpPAY does not light up.	Check power to dispenser.
	Check power to the VIB2. If dispenser has power but VIB2 does not then replace the VIB2.
	If there is no power to the VIB2 and the Secure PumpPAY does not light up then check the cable connections from the Power Distribution Board to Secure PumpPAY.
The OP4100 displays, "Hardware Error".	This is caused by the Secure PumpPAY being tampered with. The Secure PumpPAY will need to be replaced.
Printer text prints on the edge of the receipt.	This is typically caused when the wrong paper is used at a Secure PumpPAY site. The paper should be 2 5/16" wide, Bennett's Part Number is 112028.
Printer is non-responsive.	Check to ensure the printer cables are securely seated and not pinched in the door.
	Replace the cables and if the printer still does not work then replace the printer.
	If the replacement printer is not immediately available, unplug the printer (both power and data cable) and let it sit overnight, then re-connect. It may continue to work for awhile.

Secure PumpPAY (Card Reader)
Troubleshooting

Symptom	Possible Cause/Resolution
Printer was having issues and when the Printer Diagnostics was completed the message was: 1. No status received, or 2. Printer Not Responding. The printer has power and you can feed paper.	Check to ensure the printer cables are securely seated and not pinched in the door.
	Replace the cables and if the printer still does not work then replace the printer.
	If the replacement printer is not immediately available, unplug the printer (both power and data cable) and let it sit overnight, then re-connect. It may continue to work for awhile.
Printer is jamming.	This is typically caused when the wrong paper is used at a Secure PumpPAY site. The paper should be 2 5/16" wide, Bennett's Part Number is 112028.
The Secure PumpPAY unit displays, "Please Pay Inside (E01)" AND when the View is pressed on the POS it shows, "IN USE".	Fueling point may be stuck in Prepay/Reserve state. This can happen if the customer hits ENTER and CANCEL at the zip code prompt without entering any digits. Have the cashier clear the pump in reserve – may need to clear pumps on hold first, then clear pump in reserve. Or have the cashier go out to the fueling point, lift the handle, select a grade, push start, etc., then replace the nozzle – this will clear it back to IDLE state.
The display on the Secure PumpPAY unit is very dim or appears to not be working.	On the back of the Secure PumpPAY unit, next to the Ethernet connection, there is a small screw. This is a brightness setting. Turning the screw clockwise will add brightness and turning counter clockwise will decrease the brightness.

Secure PumpPAY (Card Reader)
VIB2 Board



VeriFone Interface Board (VIB2) - 111714

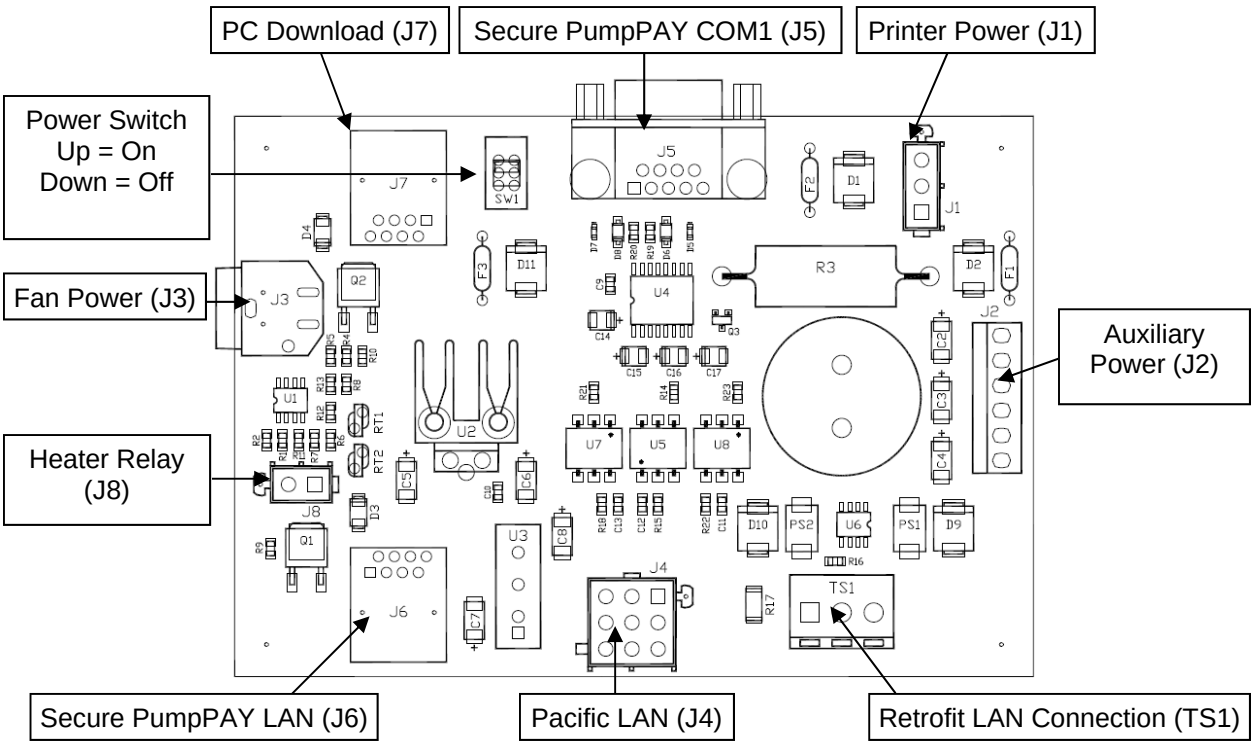
Board Functions:

- Provides power for the printer.
- Provides power for the Secure PumpPAY.
- Provides power for the fan.
- Communication for the Secure PumpPAY is routed through this board.
- Data for the printer is routed through this board.
- Contains the thermostat for the fan.
- Communication for the SPP Installer is routed through this board.
- Power switch (SW1) for the power to the Secure PumpPAY.

LED's:

- D5 (red) RS-232 communications to the Secure PumpPAY (Receive).
- D7 (green) RS-232 communications from the Secure PumpPAY (Transmit).

Secure PumpPAY (Card Reader)
VIB2 Board



Board Specs

J1 - Printer Power
- Pin 1 - 24vdc
- Pin 2 - vcc
- Pin 3 - common

⇒ F1 - 3A

⇒ F2 - 3A

J2 - Auxiliary Power
- Pin 1 - 24vdc
- Pin 2 - 12vdc
- Pin 3 - vcc
- Pin 4 - 24vdc (printer)
- Pin 5 - common
- Pin 6 - common

J3 - Fan Power
- Pin 1 - 12vdc
- Pin 2 - common
- Pin 3 - N.C.

J4 - Pacific LAN
- Pin 1 - 24vdc
- Pin 2 - 12vdc
- Pin 3 - N.C.
- Pin 4 - Data +
- Pin 5 - Data Return
- Pin 6 - Data -
- Pin 7 - common
- Pin 8 - common
- Pin 9 - common

J5 - Secure PumpPAY COM1

⇒ F3 - 3A

J6 - Secure PumpPAY LAN

J7 - PC Download

J8 - Heater Relay
- Pin 1 - 12vdc
- Pin 2 - common

TS1 - Retrofit LAN Connection
- Terminal 1 - Data -
- Terminal 2 - Data Return
- Terminal 3 - Data +

Notes

Error Codes

Error Code	Problem
00	**No Error**
02	RAM Error - The RAM initialization string does not match that in ROM
13	Pulser A Error– The pulser interface generated an error output while pulser A was active
23	Pulser B Error- The pulser interface generated an error output while pulser B was active
33	Pulser C Error- The pulser interface generated an error output while pulser C was active
43	Pulser D Error- The pulser interface generated an error output while pulser D was active
51	Grade A Low– Product A exceeded the error band (%)
52	Grade B Low– product B exceeded the error band (%)
60	Mailbox Overflow - Internal Error
70	Not Calibrated or Bad Checksum - The calibration values are not initialized or the EPROM checksum is invalid
71	Ecal constant out of range error - The ecal adjustment is outside the allowable calibration range
72	Vapor Recovery Error - The vapor recovery device generated an error
74	Electronic Calibration Switch is in Calibrate Mode
83	Pulser Disconnected - The pulser circuit is disconnected
93	Pulser Circuitry Error - This is the pulser error catch
99	CPU Failure—addition error

Clearing Error Messages - In the event of an error, a message will be displayed on the side of the dispenser where the error occurred. Any error message will shut down the sale but not disable the pump. To clear an error message simply lower the handle or put the nozzle back in the boot and remove the nozzle again. This should clear the error message. If it doesn't, try removing the nozzle or lifting the handle and replacing it once again. A list of stored error codes is stored chronologically in diagnostic mode 2.

Make sure you repair the problem that may have caused the error condition first and then clear the message.

For persistent error codes and their remedies contact Bennett Technical Support at 1-800-423-6638.

Notes

Troubleshooting Breakdown

Symptom	Possible Cause	Corrective Action
Hose does not dispense fuel	The dispenser isn't turned on.	Turn on the dispenser
	The submerged pump isn't turned on.	Turn on the submerged pump
	There isn't enough fuel in the tank.	Make sure there is adequate fuel in the tank. Take a stick reading and make sure there is at least 12 inches of fuel
	Isolation valve is closed	Open the isolation valve in the submerged pump manhole.
	Electronic Leak Detector has disabled the submerged pump	Follow the service procedures for the Leak Detector to re-enable the submerged pump.
	The valve isn't opening.	Check to make sure that the valve is opening by taking the voltage readings on the 24vdc circuit. Refer to the section on CPU board
	The dispenser is not authorized	If the dispenser is connected to the console, is the console sending down authorization for the pump to turn on? Refer to the Point of Sale reference manual. Put the pump in stand alone and test
	Blown fuse on the Power Distribution board due to cross phasing of the dispensers.	Refer to the section on the Power Distribution Board for service instructions
	Bad Valve	Replace with a known good valve.
	CPU is locked up	Power down the dispenser and bypass the battery. Power the dispenser back up and re-try.
	Meter is not turning	Check to see if the meter turns. If not replace the meter.
	Shear valve is closed	Open the shear valve for that product at the base of the dispenser.
	The maximum allocation is set to zero	Change the setting in programming to a higher number. Example) 50
	Nozzle is broken	Replace the nozzle
Hose does not dispense fuel	The hoses are hung up in the wrong nozzle boots	Make sure that the correct hoses are in the correct nozzle boots
The Dispenser constantly "calls in"	Bad Handle Switch	Replace handle switch
	Card Reader Payment Key Stuck	Lubricate Key with silicon lubricant
The prices are not showing up in the correct PPUV windows	The Point of Sale needs to be programmed correctly.	The Pacific puts the Diesel product as the first product instead of the 4th product.

Troubleshooting Breakdown

Symptom	Possible Cause	Corrective Action
The Display is blank	Dispenser is turned off	Check the power switch inside the dispenser. Turn it on.
	Blown Fuse	Check the system fuse on the Power Distribution Board. Refer to the Power Distribution Board section.
	Dispenser has been turned off from the main power panel	Turn on the breaker for this dispenser inside the building.
	Bad Display Board	Replace the Display Board with a known good one
	Bad CPU	Replace the CPU with a known good one.
The dispenser does not "call in"	The dispenser is in stand alone	Program mode 21 to put the dispenser in "console" control.
	The handle switch is not working properly.	Make sure the handle switch is working properly by running diagnostics mode 5. If not, the handle switch , handle switch cable, barrier board or CPU could be the problem. Troubleshoot as needed.
	Bad Intrinsically Safe Barrier Board or loose cable	Check to make sure the handle switch cable is making good contact with the connector. Replace ISB if necessary with a known good one.
	The 515 box has lost communication	Reset the 515 controller by power cycling it for 15 seconds.
	Check the Point of Sale system for proper programming	Is the Point of Sale set up for "Handle up Calling"?
The segments in the display don't look right.	The display board is broken	Run diagnostics on the display. Do all the segments light up? If not, replace the display board.
	The EPROM's have a bent pins.	Remove the EPROM's and check for bent pins. Re-install the EPROM's.
	Loose cable in the electronics	Check the cables going to the Display Board. Refer to the Display Board section for trouble shooting.
Backlight doesn't come on	Dispenser is in power fail	Once main power returns to the dispenser the light should come back on
	Cable came loose from the Display Board to the Backlight board.	Check the small power cable for lighting that connects the Display Board to the Backlight Board.

Troubleshooting Breakdown

Symptom	Possible Cause	Corrective Action
Managers Keypad does not get into the programming mode	The keypad cable is plugged into the wrong side of the dispenser	Plug the Manager Keypad into J4 of the Product select / Auxiliary Backlight Display Board on side 1 of the dispenser
	A handle switch has been activated	Make sure all the handles are hung up. The system cannot enter Managers mode if a handle is removed.
Dispenser does not stop at preset amount	Attendant waiting longer than 60 seconds between the time he presets the pump and actually starts pumping fuel. The pump is timing out	Teach the attendant that he only has 60 seconds after setting the preset before it times out and will over run the preset amount
Dispenser does not stop at Pre-pay amount	Valve not closing in time	Extend the slow flow offset.
		Or change out the valve with a known good one.
Ghost Sales	Ruby sending prices on a pre-authorized dispenser	Install version 5.00.00 or greater in the 515 interface box
No communication with console	Installation Wiring	Make all wiring in accordance with Installation Manual #105894
	Point of Sale Console not set up properly	Ensure the Point of Sale has been set up properly
	515 box turned off	Turn on the 515 box
	Dispenser in Stand Alone mode	Program the dispenser for “console” control in mode 21
	Bad cable from 515 to VeriFone Point of Sale	Swap cable with a known good one
	Maximum length has been exceeded	Make sure that there is no more than 1000 feet between the dispenser and the 515 box
	Bad Power Distribution Board	Replace Power Distribution Board with a known good one
	Bad CPU Board	Replace CPU with a known good one
	Ribbon Cable between CPU Board and Power Distribution Board	Make sure that the connections are snug. Replace Ribbon Cable.
Valve or valves are not opening	Loss of 24vdc	Troubleshoot the 24vdc signal. Is it one side or both sides? Call Technical Support
	Bad Valve	Replace Valve with a known good one.
	Bad diaphragm	Replace valve with a known good one
Decimal place is wrong	Programming problem	Check modes 8 and 99
Dispenser stops pumping after several seconds	Handle switch magnet loosing magnetism	Replace the handle switch board.

Troubleshooting Breakdown

Symptom	Possible Cause	Corrective Action
The Main Display flashing a Pulser Error Message	There has been a diagnostic failure—the pump locked up	Run diagnostics-CPU test. Reset the pump and test.
	The pulser is defective	Swap the pulser with a know good one and retest
	There is a bad connection	Check the ribbon cable from the pulser, make sure it's connected properly
		Make sure the daisy chain ribbon cable is connected to the proper pulsers and in the right order
	The jumper is missing or set incorrectly on the last pulser in the chain	Set the jumper across pins 13 and 14 on the last pulser in the chain.
Dispenser pumps in slow flow all the time	Pulser Problem	The dispenser not seeing 9 pulses from both phases and is never coming out of slow flow. Replace the pulser
	Valve problem	The fast flow valve is not opening. Check for proper voltages and replace valve with known good one if necessary.
	Leak Detector Problem	Could have a possible leak in the piping.
Dispenser electronic head is wet on the inside	Door locks are not closed properly	Close and lock the doors properly
	Water getting in some other way	Call Bennett Technical Support
The display amount is different from the console amount for that sale.	Incorrect setting for "rounding" in the dispenser	Check the dispenser programming to see how it is set. Is it set to cross multiplication, rounding or truncating?
Dispenser seems to be pumping slowly	Clogged filter	Clean or change filter
	Some type of restriction in the line	Diagnose accordingly. Pumps usually pump 10 gallons per minute.
	Low pressure	Install a pressure gauge on the inlet. Normal pressure should be about 28 PSI on a 3/4 H.P. pump. Call Technical Support

Notes

Diagnostics

How to Use Diagnostics
Menu Code 0

To enter Diagnostics the manager's keypad must be connected to the dispenser to place the dispenser into the manager's mode. See page 18 for instructions on how to attach the manager's keyboard. Make sure the A.C. Reset switch is in the ON position, and the pump handles are all in the OFF position. These instructions will not be repeated for each Menu Code.

Diagnostic tests have been programmed into the dispenser software to help the operator and service technician troubleshoot failures of the dispenser. The dispenser can run several levels of self-diagnostic tests to determine where the failure has occurred. The levels that will be discussed here are:

Diagnostic Code	Description	Diagnostic Code	Description
0	.1 Design Type	6	.2 Uart Failure Counter
0	.2 Software Release Number	6	.3 Cold Start Counter
0	.3 Software I.D. Number (CKsum)	6	.4 Reserved
1	Display Segment Test	6	.5 Reserved
2	Fault History	6	.6 Reserved
3	CPU Test (Error 99)	6	.7 Reserved
4	RAM Test	7	Keyboard/Switch/Beeper Test
5	Pump Handle Test	8	State Transition History
6	.1 Power Failure Counter		

By performing a diagnostic test, the operator or manager can inform the service technician of the problem before coming to the site. The service technician can then anticipate which repair parts to bring

To enter Diagnostics, follow this procedure:

After the correct number (1 or 2) has been entered for the side to be viewed, press the 0 button and then the **MODE** button on the keypad. The main display appears as in figure 1. The price shows the Side being read.

From this point, any test can be entered by pressing the number of the test and the **ENTER** button. To exit a diagnostic test, press the **CANCEL** button.

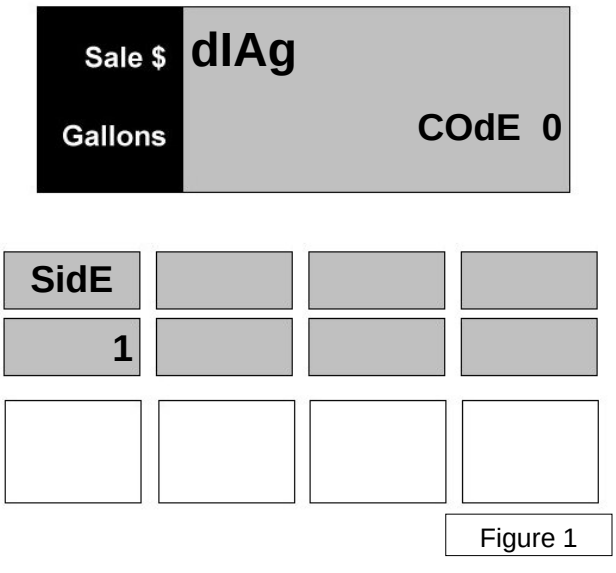


Figure 1

Diagnostics

Diagnostic Code 0

This test is used to display the design type, software revision level, and the software identification or checksum of this software.

To enter this test, enter diagnostics and press the 0 *button on the keypad and the* ***ENTER*** *button.* If you have just entered diagnostics, press **ENTER** to see the first level of Test 0.

0.1 - Design Type. The display shown in figure 2 appears. The price display shows the dispenser is in Diagnostics Level 0.1.

The number 6 is the default. It means the dispenser is a "708 CPU design" computer.

Press **ENTER** to move to the next level of Diagnostic Code 0.

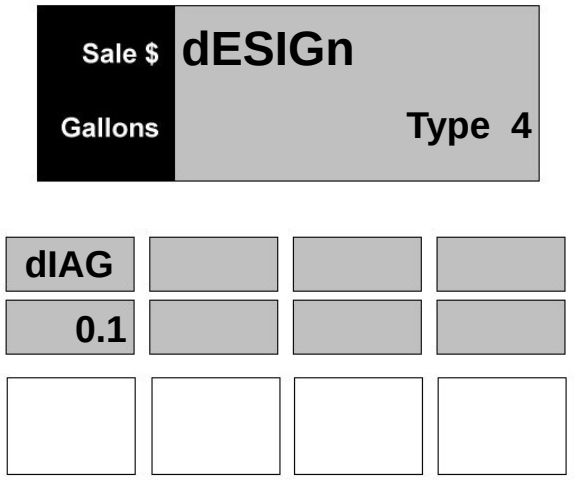


Figure 2

0.2 - Software Release Number. The display shown in figure 3 appears. The price display shows the dispenser is in Diagnostics Level 0.2.

The current level of software installed in the dispenser is displayed, which will change from version to version.

Press **ENTER** to move to the next level of Diagnostic Code 0.

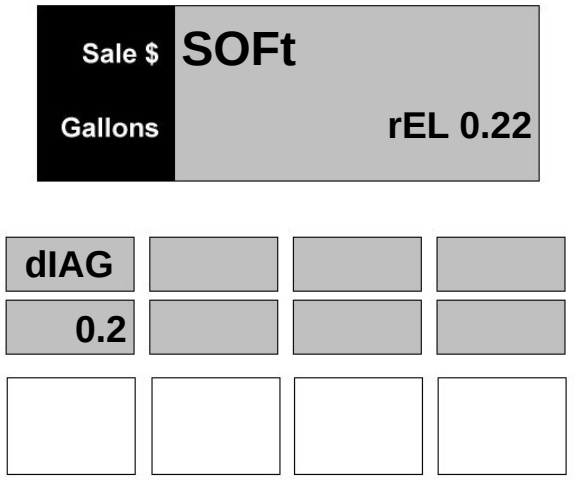


Figure 3

0.3 - Software I.D. Number. The display shown in figure 4 appears. The price display shows the dispenser is in Diagnostics Level 0.3.

This field is a number that identifies the software revision level. This will change from software version to software version.

At this point, if **ENTER** is pressed, the Design Type is redisplayed. Continue to press **ENTER** to move from one level to another of Diagnostics Code 0.

Press the **CANCEL** button to exit this code. Press the **CANCEL** button twice to exit Diagnostics.

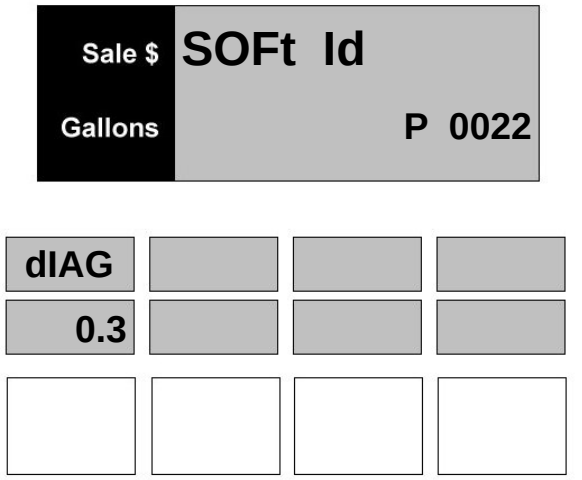


Figure 4

Diagnostics

Diagnostic Code 1 - Display Segment Test

This test is used to identify failed segments in the main sales displays or the individual price per volume (IPPV) displays.

To enter this test, enter diagnostics and press the 1 *button on the keypad and the* ***ENTER*** *button.*

The main sales display window will instruct you the press the **ENTER** button to begin (see figure 5a).

Each time you hit the **ENTER** button a new set of segments will be displayed (see figure 5b).

Press the **CANCEL** button to exit this code. Press the **CANCEL** button twice to exit Diagnostics.

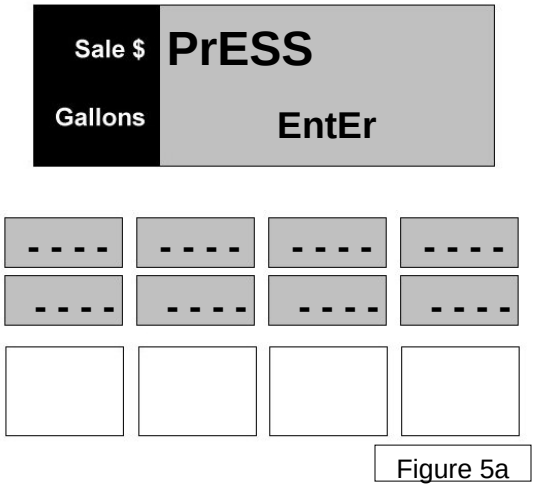


Figure 5a

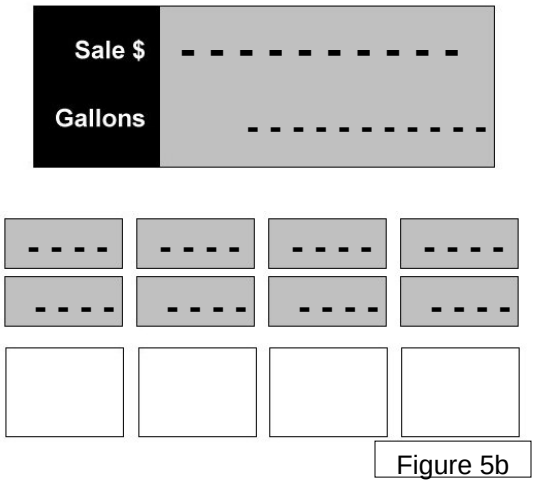


Figure 5b

Diagnostic Code 2 - Error History

The error log file provides 40 entries total. The latest 40 errors are included in the error log file. The errors are displayed for the selected side. If the latest 40 errors were all on side 2, then no errors would be displayed on side 1, and 40 errors would be displayed on side 2 (see figure 6).

To enter this test, enter diagnostics and press the 1 *button on the keypad and the* ***ENTER*** *button. Press the Enter button to view the data in descending chronological order.*

Press the **CANCEL** button to exit this code. Press the **CANCEL** button twice to exit Diagnostics.

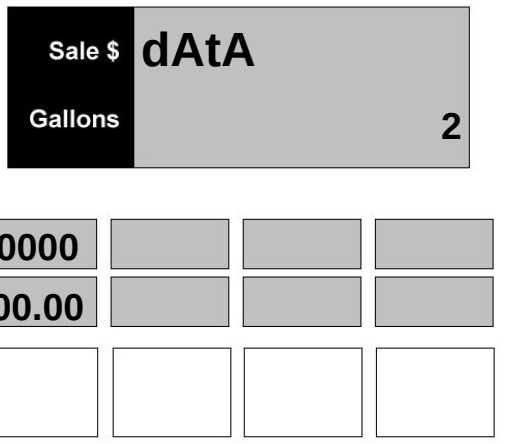


Figure 6

Diagnostic Code 3 - CPU Test

This test deliberately introduces a fault into the arithmetic unit of the CPU. The display must then read **ERROR 99** indicating the system has detected the fault. If the message is not displayed, the test has failed.

*To enter this test, enter diagnostics and press the 3 button on the keypad and the **ENTER** button.*

A typical test appears as in figure 7.

The 99 error will clear when the **CANCEL** button is pushed to exit Diagnostics.

Press the **CANCEL** button to exit this test. Press the **CANCEL** button twice to exit Diagnostics.

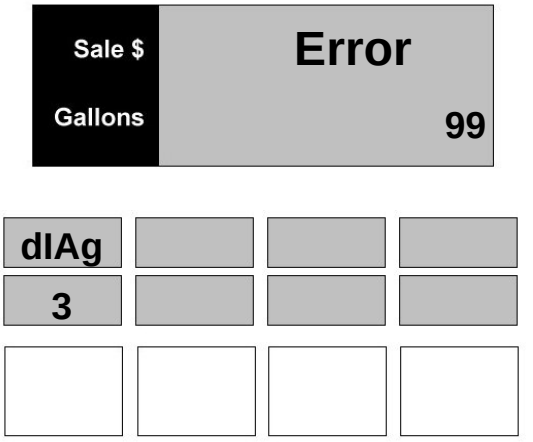


Figure 7

Diagnostic Code 4 - RAM Test

*To enter this test, enter diagnostics and press the 4 button on the keypad and the **ENTER** button.*

This test is used to test the system RAM. The CPU performs a RAM test to determine if RAM is good or corrupted.

If the RAM failure is detected by the RAM test, the displays flash the message in figure 8a.

If a RAM failure is not detected by the RAM test, the displays flash the message in figure 8b.

Press the **CANCEL** button to exit this test. Press the **CANCEL** button twice to exit Diagnostics.

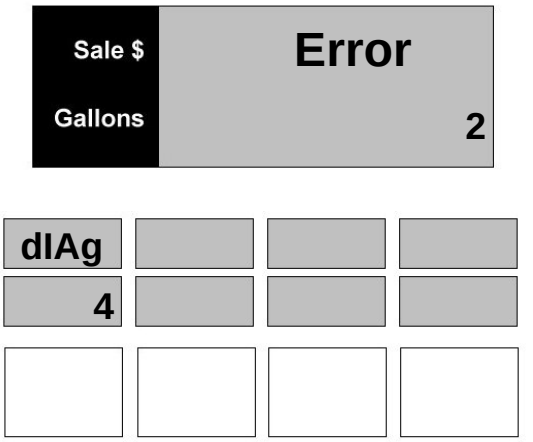


Figure 8a

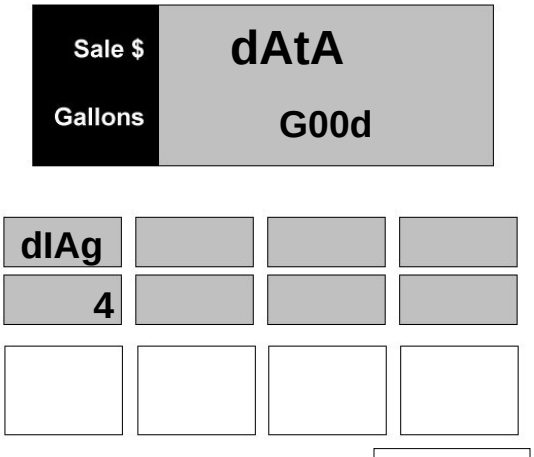


Figure 8b

Diagnostic Code 5 - Pump Handle Test

*To enter this test, enter diagnostics and press the 5 button on the keypad and the **ENTER** button.*

This test checks the status of the pump handles on the dispenser. The CPU reads the pump handle switches and writes the status of each handle to the display.

When all handles are off, the display appears as in figure 9a. When a handle is turned on, an A or b should appear. See figure 9b for an example of the A pump handle raised.

Turn each pump handle on individually or all at once to test the status.

Press **CANCEL** button to exit this test. Press the **CANCEL** button twice to exit Diagnostics.

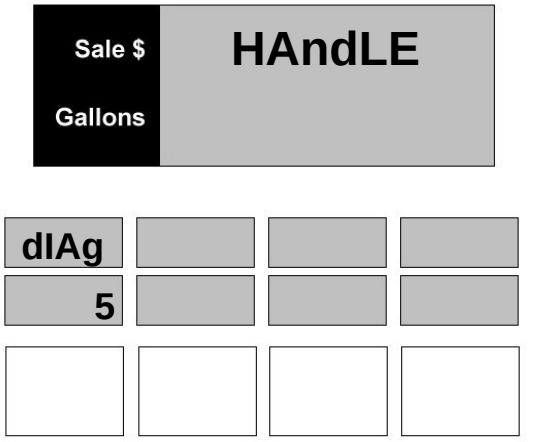


Figure 9a

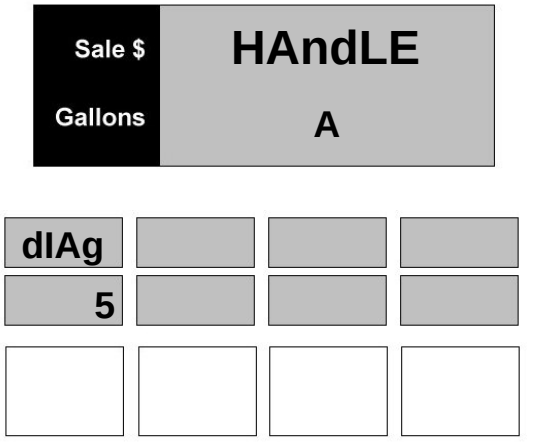


Figure 9b

Diagnostic Code 6 - Power Failure Counter

This code is used to investigate intermittent problems with power. The counters keep track of the number of times a power failure occurs.

*To enter this test, enter diagnostics and press the 6 button on the keypad and the **ENTER** button.*

6.1 - Power The display shown in figure 10a appears. The Price display shows the dispenser is in Diagnostics Level 6.1.

The number of power failures that have occurred since the system was reset (cold start) appears on the second line of the main display.

Press **ENTER** to advance to the next counter.

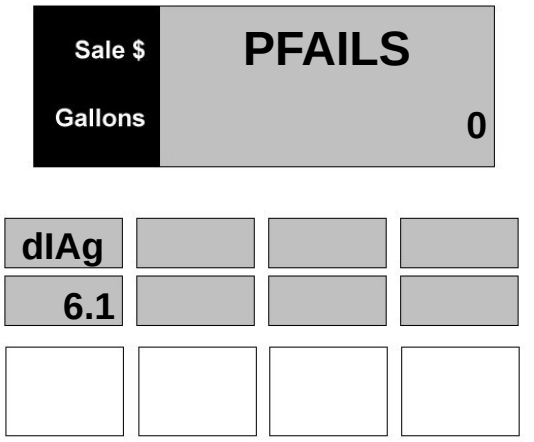


Figure 10a

Communications Failure Counter
This code is used to investigate intermittent problems with communications. The counters keep track of the number of times a communications (UART) failure occurs.

6.2 - Communication The display shown in figure 10b appears. The Price display shows the dispenser is in Diagnostics Level 6.2.

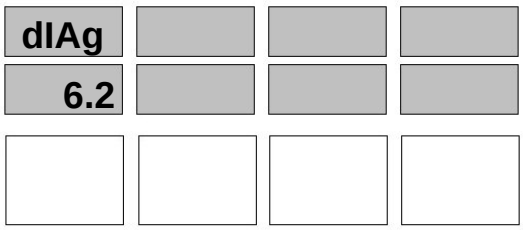


Figure 10b

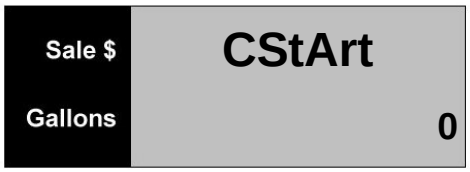
The number of communications failures that have occurred since the system was reset (cold start) appears on the second line of the main display.

To zero the counter, press the following buttons on the manager's keypad in the sequence listed:

Press -, Press ¯, Press +/-

NOTE: After this three button sequence is entered, the counter displayed is cleared.

Press **ENTER** to advance to the next counter.



***Cold Start* Counter**
This code is used to tell the technician how many times a Cold Start has been performed on the dispenser.

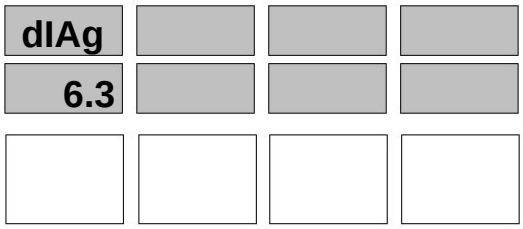


Figure 10c

6.3 - Cold Start The display shown in figure 10c appears. The Price display shows the dispenser is in Diagnostics Level 6.2.

The number of Cold Starts that have occurred appears on the second line of the main display.

Other Failure Counters

6.4 - y9Err 1
6.5 - y9Err 2
6.6 - y9tOt 1
6.7 - y9tOt 2

These counters are used for Engineering and not to be used in the field.

Press the **CANCEL** button to exit this test. Press the **CANCEL** button twice to exit Diagnostics.

Diagnostics

Diagnostic Code 7 -
Keyboard, Switch and Beeper Test

*To enter this test, enter diagnostics and press the 7 button on the keypad and the **ENTER** button.* The display shown in figure 11 appears.

This code is used to test the switches for the product buttons.

During this test the dispenser emits a tone when each product key is pressed. The name of the button appears in the top line of the display.

If no tone is heard, the button or key failed the test. The main display shows the name of the last button pressed.

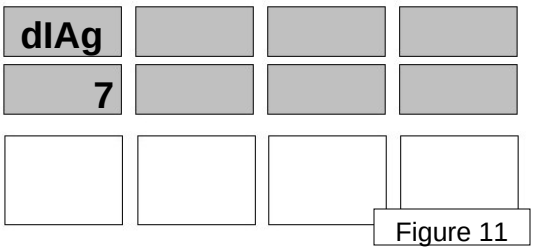


Figure 11

Press the **CANCEL** button twice to exit this test. Press the **CANCEL** three times to exit Diagnostics.

Diagnostic Code 8 -
State Transition History

This test is used to view the state transition log maintained by the CPU board. It stores a history of all state transitions which occur during the operation of the dispenser. It is capable of storing the last 40 state transitions and events that have occurred since the last cold start (zeroing the RAM).

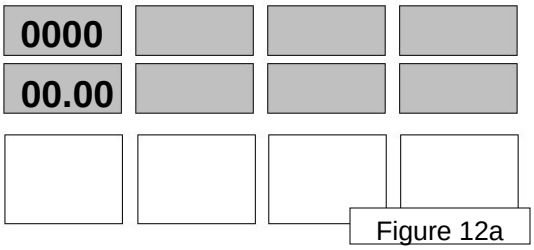


Figure 12a

Enter this code to display the states that have been stored in the dispenser memory. If no changes in state have been recorded, the display flashes the message in figure 12a.

*To enter this test, enter diagnostics and press the 8 button and the **ENTER** button.*

If there are states recorded, the display is read as in figure 12b. See explanation below:

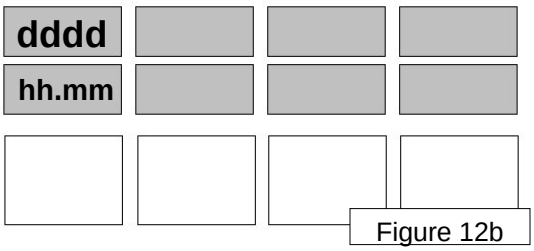


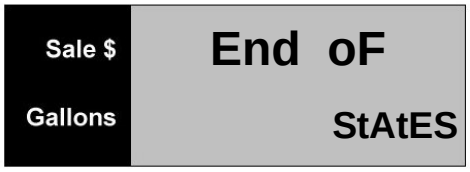
Figure 12b

State Definitions

nnnnnn	Is the six character name of the state. See Table 1 for a list of all possible state names.
ee	Is the event code for the event that caused the state transition. See Table 1 for a list of all possible event codes.
xx	Is the next state code for the transition. See Table 1 for the list of all possible next state codes.
dddd	Is the number of elapsed days from cold start that the displayed state occurred. Push volume to see the seconds.
hh	Is the hours portion of the elapsed time since the displayed state occurred
mm	Is the minutes portion of the elapsed time since the displayed state occurred.

Diagnostics

Press the **ENTER** button to view the next transition in the state transitions log. Each time the **ENTER** button is pressed the next logged transition is displayed.



The previous transition can be displayed by pressing the i button. Press the **ENTER** button to move forward through the log.

When all logged transitions have been viewed, the display flashes the message shown in figure 12c.

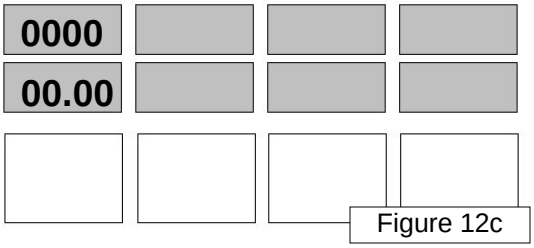


Figure 12c

Press the **CANCEL** button to exit this test. Press the **CANCEL** button twice to exit Diagnostics.

Table 1—State Descriptions

xx State Code	nnnnnn State Name	Description	ee Event Code	Event Name
00	IdLE	Idle	0	Handle Active
01	Auth	Arm	1	Handle Idle
02	HANdLE	Handle	2	Set Arm
03	rEAdy	Ready	3	Clear Arm
04	FLO	Flow	4	Flow Active
05	SUSPNd	Suspend	5	Set Paid
06	CollCt	Collect	6	Attendant Key On
07	PENDNg	Pending	7	Attendant Key Off
08	AttNdt	Attendant	8	Blank Display
09	Error	Error	9	Fault
10	ErCLCt	Error Collect	10	Noflow Timeout
11	AtCLCt	Attendant Collect	11	Power Failure
12	totALS	Totals	12	Totals Active
13	bLANcd	Blanked	13	Totals Idle
14	FLOdNE	Flow Done	14	Sale Done
15	STANd	Stand Alone	15	Error Sale Done
			16	Warm Start
			17	Self Arm
			18	Setup Change
			19	Emergency stop Active
			20	Emergency stop Idle

Maintenance

WARNING: Do not use a high pressure washer to clean the dispenser. Liquid under pressure can enter the dispenser cabinet and damage electronic components.

Keep the dispenser clean and protected. It will keep a new pump appearance longer.

To clean painted surfaces, follow this procedure:

1. Wash the dispenser in a solution of warm water and a mild detergent that removes grease and oil.
2. Rinse thoroughly with clean water.
3. Dry all surfaces with a clean cloth.

4.If the surface is dull due to oxidation, apply a cleaner specially formulated to remove oxidation to the clean surface. This will restore luster to the painted surface.

WARNING: Do not use strong detergents, petroleum solvents, abrasive cleaners or steel wool to clean the dispenser.

To clean stainless steel, anodized aluminum or chrome plated panels, follow this procedure:

1. Wash the dispenser in a solution of warm water and a mild detergent that removes grease and oil.
2. Rinse thoroughly with clean water.
3. Dry all surfaces with a clean cloth.
4. Apply a coat of non-abrasive paste wax to protect the panels from corrosion.

NOTE: To remove tree resin or sap from dispensers, use turpentine.

Notes

Bennett 1218 E. Pontaluna Road, Spring Lake, MI 49456
USA 800-235-7618 ~ Outside USA 231-798-1310
sales@bennettpump.com ~ www.bennettpump.com